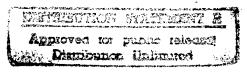
FINAL SUBMITTAL



ENERGY SURVEYS OF

ARMY INDUSTRIAL FACILITIES

ENERGY ENGINEERING ANALYSIS PROGRAM

RADFORD ARMY AMMUNITION PLANT

RADFORD, VIRGINIA

VOLUME IV

PROGRAMMING DOCUMENTS

CONTRACT NO. DACA65-€-C-0154

DTIC QUALITY INSPECTED 2

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS NORFOLK, VIRGINIA

PREPARED BY:

ENERGY AND ENVIRONMENTAL SERVICES DEPARTMENT REYNOLDS, SMITH AND HILLS, INC.
P.O. BOX 4850
JACKSONVILLE, FLORIDA 32201

MARCH 1991

19971017 274

DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005 CHAMPAIGN, ILLINOIS 61826-9005

REPLYTO ATTENTION OF:

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17 Sep 1997

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Marie Wakefield, Librarian Engineering

TABLE OF CONTENTS

<u>QRIP</u>			
•	GP-X-2 SR-I-1 GP-N-3 GP-X-4 NC-X-1	- - -	Reduce Water Flow to Incinerator (one unit only) Remove Steam Coils in Activated Carbon Area Replace Exterior Incandescents with Fluorescents Install Turning Vanes in Boiler Ductwork Modify Boiling Tub Heating Method (one tub only)
OSD PIF			
•	GP-B-4 GP-N-1 GP-X-6	-	
<u>ECAM</u>			
•	FN-U-1	-	Cover Water Dry Tanks with Insulating Spheres (one tank only)
•	GP-N-8	-	Replace Incandescents with Color-Corrected HPS Screw- Ins
•	GP-N-2	-	Replace Incandescents with Circline Fluorescents

QRIP

1 August 1982

		ſ	ON TOSIONE .			?
DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 5-4; the proponent eqency is OCA.	Y CAPITAL INVESTM the proponent agency is a				REQUIREMENT CONTROL SYMBOL DD-M(R) 1661	ONTROL SYMBOL
	3. THRU:		4. FROM: CDR, ATCCOM		6. DOD COMP NAME Ariny	6. DOD COMP CODE
5001 Eisenhower Avenue Alexandria, VA 22333-				AMSMC-MGP-P (R) 7. COMMAND C Sland, IL 61299-6000 W73QKK	7. COMMAND CODE 10 W73QKK	8. DATE
& PROJECT TITLE		10. TYPE OF PRCJECT (Check one)	1	11. AMORTIZATION VEARS/MONTHS	ARS/MONTHS	
Reduce Water Flow to Incinerator (ECO GP-X-2)	rator	OBIF OBIF	OSD PIF PECIP	7,029	4 8,416	× 51
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	occur	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Profect Cost)	(Average Annuel Sarbugu)	
024		25 yrs.		or	10 (amortization)	itz atkon)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	A hydroclone (hydraulic propellant inlet to <u>one</u> to be evaporated.	(hydraulic cyc nlet to <u>one</u> inc ated.	lone separator inerator to re	cyclone separator) will be installed at the incinerator to reduce the amount of water	alled at the t of water
it betaileb justification Installing a hydroclone will reduce the the amount of fuel oil consumed.	l .	amount of water to be evaporated by the incinerator	to be evaporate	ed by the incir	erator and the	and therefore, reduce
19. SAVINGS DISPOSITION						
Savings are used to reduce energy costs	energy costs.					
20. OTHER REMARKS (Continue on page 6, if more space is needed)	re space is needed)					

į				SUMMA	SUMMARY OF DOLLAR SAVINGS	INGS				
			4	(ROUND OF	(ROUND OFF TO THE NEAREST DOLLARS)	1 source of data for sai	ings			
	-		Affach com	PROPOSED METHOD	AETHOD			DIFFERENCE/SAVING8	SAVINGS	
SAVINGS	<u>.</u> t	PRESENT	1ST YR	2D YR	3D Y.M.	4TH YR	18T VR	20 YR	30 VR	
EALARY/LABOR/ OVERTIME)WO									
MATERIAL/ BUPPLIES										
UTILITIES										
MAINTENANCE/ NEPAIR	38									
TRANSPORTATION	NOIT									
LEASE COSTS									,	
EALVAGE/ TURN-IN										
ENERGY (Identity)	oil T	171,882	163,466	163,466	163,466	163,466	8,416	8,416	8,416	8,416
CONTRACT COSTS	CO6TS									
OTHER (Identify)	(cha)									
TOTALS		171,882	163,466	163,466	163,466	163,466	8,416	8,416	8,416	8,416
					PRIORITIZATION					
(1) INTER Divide	NAL RATI	INTERNAL RATE OF RETURN (IRR) Exists estimated project cost Based on factor and number of year	029 tra econon		nnuel savings 8,416 = 0,84 factor. project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	0.84 fs. H-3, App H, Ch. 5,	factor. 6, AR 6-4 =	295 SIRR.	88	
(2) SAVIR	NOS TO IN	SAVINGS TO INVESTMENT RATIO (8/1)	an	20 71						
Kulti fundi (Base	Multiply annual sevings - [undiscounted]	Multiply annual sevings 8,410 (undiscoursed) 7,029 (Based on economic life 25	1 1 1	ctor 17.00 8/1. count factor from Ta	ble H-4, App H,	5, AR 5-4.				
(3) PATE	E OF INVES	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	WER SPACE (RIMS)	NA				RIM8		
Divid	de estimata ipower req	Divide estimated project cost	Divide estimated project cost by numb [Nanpower requivalents cannot be used in this computation	by number of manpower space savings, putation.)	r space savings					

	CAST SAB BROIECT TO RECOME OPERATIONAL	COME OPERATIONAL				
n	TN 3N 3G TO GO SO	CNIT PRICE	QUANTITY	TOTAL COST		FY FUNDS
EQUIPMENT TYPE	PROPOSED GOONCE OF TROCONEMENT	J	70	•	5	-
<i>w</i> Hydroclone		7,029	-	7,029		
(3)						
(6)						
(4)						
(9)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²			13a- 13- 14-			
(10) FACILITIES MODIFICATION ³						
(11) TRAINING						
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	OME OPERATIONAL			7,029		
(14) TOTAL AMOUNT OF FUNDING REQUESTED	UNDING REQUESTED IN THIS PROPOSAL			7,029	19.0 (
(16) TOTAL AMOUNT OF FL	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE $^{oldsymbol{ heta}}$			0		
(16) TOTAL (8um of (14) + (15) above)	(15) above)			7.029		
IN S. C. and immediately D. M. Land of the Co.	and of					

 $^{^{}I}$ Not to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial main tenance.

³ Normally not OPA funded

Used to compute amortitation in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

1 August 1982

Toer remains I									
T.		(4	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS)				
		SAVINGS				REAPPLICATION OF SAVINGS	SAVINGS		
ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	IND LINE	FUNCTION CODE	4 CODE
•	•	U	70	e. FROM	, TO	g. FROM	10	L FROM	10
REQUIREMENTS AND (1) AUTHORIZATIONS ELIMINATED	Q								
(2) REQUIREMENTS ONLY ELIMINATED									
BORROWED MILITARY (3) MANPOWER RELEASED									
OVERHIRES ON TEMPORARIES (4) TERMINATED									
(6) HOURS OVERTIME ELIMINATED								-	
MANHOURS SAVED FROM MULTIPLE POSITIONS									
OTHER DOLLAR SAVINGS (7) (Excluding Mempower), e.g., CONTRACT COSTS & UTILITIES			8,416				e de la composition della comp		
(9)							•		
(6)									
(10)						·			
(11) TOTAL BOLLAR SAVINGS			8,416			•			
6 (1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Offices (6) WO (7) Enlisted	Reflect specific duties being p	e dutes being per	xerformed with additional mankours available (equivalent manyears)	mei menkours eveile	de (equivalent mas	prosra			

1 August 1982

DATE (YYMNDD) DATE (YYMMDD) DATE (YYMMDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVOR AUTOVON (Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE A OTHER COORDINATION (Punctional Coordination of local level, e.g., Fac Eng. Log. Pers. etc.) 25. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project Initiator) 26. APPROVAL RECOMMENDED BY (MACOM/Apricy) 20. OTHER REMARKS (Cont'd) 27. APPROVED BY

SUBJECT		AEP NO	
		SHEET	OF
DESIGNER	G, FALLON	DATE	114/90
CHECKER	P. Huthins	DATE	0/14/90

ECO# GP-X-2 REDUCE WATER FLOW INTO INCINERATOR

The Combustion program was adapted to Eliminate boiler Absorbtions of Heat by Zeroing the appropriate parameters. Those are shown on the "INPIT" pages of the ENCLOSED runs.

THE INCINERATOR EVAPORATES 2000 LBS/HR OF WATER. THE

FUEL FLOW RECESSARY TO ACCOMPLISH THAT WHILE MAINTAINING

A 1000 FEXIT WAS TEMPERATURE WAS DETERMINED BY ITERATION.

This relationship was subsequently maintained for THE

KEMAINING COMPUTER PURS.

The graph was Generated by Varying THE WATER FLOW (and therefore Fuel Flow) while maintaining The 1000'F Exit GAS Temperature.

ENER / LOSS DE 2000 LBS /AR HO COMPUTER SHEETS

ENERGY LOSS From SAGE TA = 4.45 MBTL /4R

ENERGY NOSS ST 1800 -35/HIL HO

COMPUTER SHEETS

ENERS, LOSS FROM PAGE 4,00 NO BTU/ HIL

PNNUAL ENERGY SAVED FROM EACH INCINERATOR

DATA SHOWS 50% INCINERATOR NOAD FACTOR

(4.45-4.00) mbtter 3763 4/rx. 5 = 197/ MB+u/yr

ENEWS/ SAVINGS FIR BOTH INSTREAMORS

1971 MBTU/4r x2 = 3942 MBTU/4r

RSH	7
	➂

SUBJECT		AEP NO _		
		SHEET	OF	
DESIGNER	PFH	DATE	10/29/20	_
CHECKER		DATE		_

For PRIP

current energy use for 1 incinerator

From Table z-1 annual quel oil bill is #343,763 (Other, # z fuel oil)

For one incenerator # 343,763/2 = \$ 171,882/yr.

Savings for oue incinerator hydroclone is

3942/2 = 1971 MBta Jueloil

Value of savings =

1971 * #4.27 = #8416/yr.

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

CLIENT	COE	DATE	14-Jun-90
PLANT	RAAP	TIME	12:31 PM

FUEL ULTIMATE	ANALYSIS	ממע בוובו	nnv •	ADTHETED
CONSTITUENT	WT.PCT.	ORY FUEL RECEIVED	DRY & ASH FREE	ADJUSTED FUEL
CARBON	12.48	86.40	86.40	86.40
HYDROGEN	1.83	12.70	12.70	12.70
OXYGEN	0.01	0.10	0.10	0.10
NITROGEN	0.01	0.10	0.10	0.10
SULFUR	0.10	0.70	0.70	0.70
CHLORINE	0.00	0.00	0.00	0.00
WATER	85.56	0.00	0.00	0.00
INERTS	0.00	0.00	0.00	0.00
TOTAL	100.00	100.00	100.00	100.00

FUEL RATE (TONS/DAY)	28	
TOTAL AIR ASSIGNED (%)	115	
FUEL HIGHER HEATING VALUE (BTU/LB)	1902	
HEAT LOSS DUE TO UNBURNED CARBON (%)	0.00	
CARBON IN RESIDUE (%)	0.00	
EXIT GAS TEMPERATURE (Deg. F)	1000	
AMBIENT DRY BULB TEMP (Deg.F)	80	
HUMIDITY RATIO (LBS H2O/LB DRY AIR)	0.0132	
BAROMETRIC PRESSURE (IN.Hg.)	29.92	
RADIATION LOSS (%)	0.00	
UNACCOUNTABLE LOSS (%)	0.00	
ENTHALPY ADDED IN BOILER (BTU/LB)	0	

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

CLIENT	COE	DATE	14-Jun-90
PLANT	RAAP	TIME	12:31 PM

HEAT LOSSES	MMBTU/HR	PERCENT
IN DRY FLUE GAS	1.31	29.37
FROM H20 IN AIR	0.02	0.35
FROM H20 IN FUELSENSIBLE	0.50	11.21
FROM H20 IN FUELLATENT	2.63	59.06
TOTAL IN WET FLUE GAS	4.45	100.00
DUE TO UNBURNED CARBON	0.00	0.00
DUE TO HOT ASH	0.00	0.00
DUE TO RADIATION & UNACCOUNTABLE	0.00	0.00
TOTAL	4,45	100.00

0.00
ERR
0
3.41
42.47
2.38
13.712
5635

FLUE GAS ANALYSIS

% BY VOLUME * BY WEIGHT -----WET DRY WET DRY ------13.41 19.38 002 7.64 13.39 0.0856 0.0232 0.0406 0.0592 S02 3.04 2.89 2.11 02 1.65 0.0000 0.0000 0.0000 0.0000 HCL 47.77 53.61 77.49 N2 83.68 H20 42.91 30.81

FLUE GAS FLOWS

	WET	DRY
MASS (LBS/HR)	7972	5516
VOLUME (ACFM)	5643	3222
(SCFM)(70DEG.F.)	2049	1170
@ 12% CO2	1305	1305
"F" FACTOR		
(DSCF/MMBTU @12% CO2)		17605

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

**************************************	N P U T-	INPUT- 1	NPUT-	INPUT-	INPUT-	
CLIENT	T COE			DATE	14-Jun-90	
PLANT	RAAP			TIME		
FUEL ULTIMATE		oov cue	004.	40 THC#F0		
CONSTITUENT		ORY FUEL RECEIVED				
CARBON Hydrogen	12.48	86.40 12.70 0.10	86.40 12.70	86.40 12.70		
OX YGEN	0.01	0.10 0.10	12.70 0.10 0.10	0.10 0.10		
NITROGEN SULFUR	0.01	0.10	0.10	0.10		
CHLORINE	0.10 0.00 85.56	0.00	0.00	0.00		
WATER	85.56	0.00	0.00	0.00		
INERTS	0.00	0.00	0.00	0.00		
TOTAL	100.00	100.00	100.00	100.00		
FUEL RATE (TO	NS/DAY)			25		
TOTAL AIR ASS		_ /		115		
FUEL HIGHER H				1902 0.00		
CARBON IN RES		U CHROUN (A)		0.00		
EXIT GAS TEMP		g. F)		1000		
AMBIENT DRY B				80		
HUMIDITY RATE				0.0132		
BAROMETRIC PR	•	Hg.)		29.92		
RADIATION LOS				0.00		
UNACCOUNTABLE		(DTU (D)		0.00		

ENTHALPY ADDED IN BOILER (8TU/LB)

0

ADIABATIC FLAME TEMPERATURE & COMBUSTION CALCULATIONS

CLIENT	COE	DATE	14-Jun-90
PLANT	RAAP	TINE	06:54 PM

HEAT LOSSES	MMBTU/HR	PERCENT
IN DRY FLUE GAS	1.18	29.37
FROM H20 IN AIR	0.01	0.35
FROM H20 IN FUELSENSIBLE	0.45	11.21
FROM H20 IN FUELLATENT	2.36	59.0 7
TOTAL IN WET FLUE GAS	4.00	100.00
DUE TO UNBURNED CARBON	0.00	0.00
DUE TO HOT ASH	0.00	0.00
DUE TO RADIATION & UNACCOUNTABLE	0.00	0.00
TOTAL	4.00	100.00

BOILER EFFICIENCY (%)	0.00
STEAM GENERATED (LBS/HR)	ERR
UNBURNED CARBON (LBS/HR)	0
LBS OF WET FLUE GAS PER LB FUEL	3.41
SPEC.VOL.OF WET FLUE GAS (CU.FT./LB)	42.47
AIR TO FUEL RATIO (LB AIR/LB FUEL)	2.38
COMB. AIR SPECIFIC VOL. (CU.FT/LB)	13.712
COMBUSTION AIR FLOW (LBS/HR)	5071

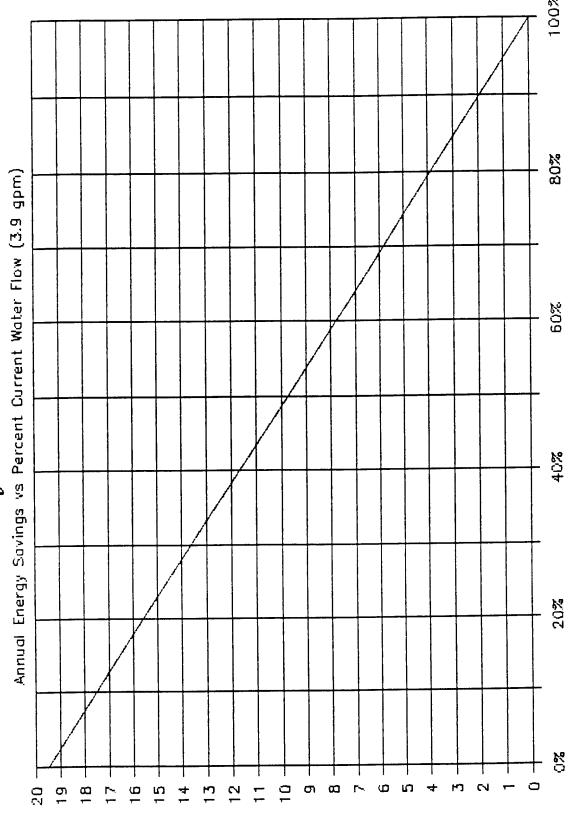
FLUE GAS ANALISIS

	% BY VOLUME		₹ BY WE	IGHT
	WET	DRY	WET	DRY
C02	7.64	13.39	13.41	19.38
S02	0.0232	0.0406	0.0592	0.0856
02	1.65	2.89	2.11	3.04
HCL	0.0000	0.0000	0.0000	0.0000
N2	47.77	83.68	53.61	77.49
H20	42.91		30.81	

FLUE GAS FLOWS

	WET	ORY
MASS (LBS/HR)	7175	4964
VOLUME (ACFM)	5079	2899
(SCFM)(70DEG.F.)	1844	1053
@ 12% CO2	1174	1174
F FACTOR (DSCF/MMBTU @12% CO2)		17605

Radford Army Ammunition Plant



Annual Energy Savings (Mbtu)

Current Water Flow (%)

HunTer

Telephone Call Confirmation

			Project No	290-0379-0	00
ocal	L.D			Date	
		Conversed	d With	(404)	394-62
-	DORR OLI			CLONES	
1" HYD	POCLONE	is correct	SIZE PR	OVIDED PART	TICLES
CAN DA	+SS 4 mm	ORIFICE	will ac	OVIDED PART	417
Oor K	TO 30 M	2T 50 P	SIA DP.	cost is	4,00.
3000					
		<u> </u>			
					.
					
	4,		-		

CONSTRUCTION COST ESTIMATE				OATE PREPARED		SHE	EET OF
PROJECT						OR ESTIMATE	
ENERGY ENGINEERING ANALYSIS							
RADFORD ARMY AMMUN			DDE B (Prelimi] CODE C (Fin	-			
_ ·	REYNOLDS, SMITH AND HILLS A.E.P., IN					THER (Specify)	
DRAWING NO.		ESTIM	ATOR		1	CHECKED BY	ATA
	QUANT		n. FA	LABOR	1	<u> </u>	JA
ADD HYDROCLONE SUMMARY	NO.	UNIT	PER	TOTAL	PER	TOTAL	TOTAL
TO INCIN. SCURRY LINE	PTIMU	MEAS.	-		UNIT	TOTAL	- Cos.
1.N HUDROCLONE	1	EA	30	30	#100	100	/30
1"316SS 01PE	300	ft	3.99	1197	7,42	222	6 3423
FibergLASS INSULATION		ļ			ļ		
OD SERVICE JACKET		ļ					
I'WALL, I'pipe	300	CT	1,56	468	1.37	411	879
SUB TOTAL				1695		2737	7 4402
LUCATION			.683	1158	1.002	2742	- 3900
	1						
SALES TAX 459	101			0		12:	3 123
SUB TOTAL				1158		2865	7 4023
FICA/INSURANCE	20313						805
SUB TOT				·			4828
OH (15%)							724
SOB 102							5552
PROF (10%)						•	555
SUB TOT							6107
BONO (1%)							41
200 104							6168
CONTINGENCY (7,5%)						463
SUB YOU	<u></u>					····	6631
Herevies Supposes (2))						399
-NAL							7029
				Two h	yaro	lover	12
					4		4
					est in		#14,058
				_			/
						-	

1 August 1982

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proponent agency is OCA.	MENT PROGRAMS	1. PROJECT NO.		REQUIREMENT C DD-M(1	REQUIREMENT CONTROL SYMBOL DD-M(R) 1861
		4. FROM: CDR, AMCCOM		6. DOD COMP NAME Army	6. DOD COMP CODE A
5001 Eisenhower Avenue Alexandria, VA 22333-0001		Attn: AMSMC- Rock Island	AMSMC-MGP-P (R) Island, IL 61299-6000	7. command code W73QKK	8. DATE
	10. TYPE OF PRCJECT (Check one)		11. AMORTIZATION YEARS/MONTHS	ARS/MONTHS	
Remove Steam Coils from Activated Carbon Area (ECO SR-I-1)	OBEO X	OSD PIF PECIP	17,057	+ 13,979	X 21
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Coat)	(Average Annual Savbigs)	Serbigs) (Na Ma
024			yo (years)	14.6 (months)	(amortzation)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	17. PROJECT DESCRIPTION				
Administrative Contracting WOLLAA	Remove disconnected recovery area and a	Remove disconnected preheat steam coils in the activated carbon so recovery area and adjust fan drive to provide design air flow with	preheat steam coils in the activated carbon solver djust fan drive to provide design air flow with	the activated ide design air	carbon solver flow with
Radford Army Amnunition Pt. Radford, VA 24141	reduced syste	reduced system air pressure.			
18. DETAILED JUSTIFICATION					
Steam heating coils previously used to carbon solvent recovery process. These Removing these coils will reduce the to	sed to preheat outside air entering the charcoal tanks in the activated These coils are no longer used and the steam supply has been disconne the total pressure to be overcome by supply air fans.	leat outside air entering the charcoal tanks Is are no longer used and the steam supply pressure to be overcome by supply air fans.	he charcoal tar the steam suppl supply air far		the activated been disconnected.
19. SAVINGS DISPOSITION					
Savings are used to reduce energy costs.			·		
20. OTHER REMARKS (Continue on page 5, 1f more space is needed)					

1 August 1982

۱,				SUMMA	SUMMARY OF DOLLAR SAVINGS	/INGS				•
!				(ROUND OF	F TO THE NEAREST	d source of data for s	wings			
			Attach	PROPOSED METHOD	Attach computation theel packing the me me me packing the packing			DIFFERENCE/SAVING8	SAVINGS	
3	SAVINGS	PRESENT	1ST YR	2D VR	3D Y.R.	4TH YR	18T VR	20 VA	30 YR	ATH VR
ALARY/L/ VERTIME	ALARY/LABOR/ VENTIME						·			
LATERIAL/ UPPLIES	NAU ES									
TILLITIES	831									
LAINTE	LAINTENANCE/									
1	MANSPORTATION									
EASE	EASE COSTS									
TURN-IN	AGE/							ł		1
ENER	Electricity	62,123	48,144	48,144	48,144	48,144	13,979	13,979	13,979	13,979
E	CONTRACT COSTS									
OTHE	OTHER (Identify)									
	TOTALS	62,123	48,144	48,144	48,144	48,144	13,979	13,979	13,979	13,979
					PRIORITIZATION					
ŝ	INTERNAL RAT Divide estimate Based on facto	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 17.057 by average an Based on factor and number of years economic life of the 1	.057 by averages seconomic life of t	by average annual savings nic life of the project, select	nual savings 13.979 - 1.22 factor. project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4 -	1,22 1 H-8, App H, Ch. 5		138. SIRR.	ස්	
ē	SAVINGE TO IN	SAVINGE TO INVESTMENT RATIO (\$/1)								
<u> </u>	Multiply annual savings. (undiscounted) (Based on economic life.	13,979 1,17,057 comic life 15	X discount factor		8.78 • 122,736 and div 8/1. factor from Table H-4, App H, Ch. 5, AR 5-4	6_and divide by p 6, AR 5-4.	_and divide by present value of investment , AR 5-4.	vestment		
3	RATE OF INVE	MATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	ER SPACE (RIMS)	NA						
	Divide estimal (Menpower re	Divide estimated project cost	by numbered in this computation.	umber of manpower	ir of manpower space savings			KIMB.		
_										

23	COST FOR PROJECT TO BECOME OPERATIONAL	OME OPERATIONAL				
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT		QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS REQUIRED
•	•	5	•		,	
m			i			
(2)						
(8)						
(5)						
9						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION			 1			
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ³			1)a			
(10) FACILITIES MODIFICATION ³					-	
(11) TRAINING						
(12) OTHER (Specify): Remove coils ar	and adjust fan drives			17,057		
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	AE OPERATIONAL			17,057		
(14) TOTAL AMOUNT OF FUNDING REQUESTED	NDING REQUESTED IN THIS PROPOSAL			17,057		
(16) TOTAL AMOUNT OF FUR	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			0		
(16) TOTAL (8um of (14) + (15) abour)	S) about)			17,057		
Not to exceed 10% of equipment cont for ORIP projects.	ло <i>к</i> сп.					

Not to exceed 10% of equipment cost for QRIP projects.

²Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

³Normally not OPA funded

⁴Used to compuse amortization in Item 11.

 $^{^{}S}$ gectly source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

ŭ		18	SUMMARY OF SAVII	SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
		8AVING8				REAPPLICATION OF SAVINGS	SAVINGS		
ITEM	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	IND LINE	FUNCTION CODE	1 CODE
•	•	v		e. FROM	, TO	E. FROM	10	L FROM L	10
REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
(2) REQUIREMENTS ONLY ELIMINATED									
(3) MANPOWER RELEASED		111111111111111111111111111111111111111							
OVERHINES OR TEMPORARIES (4) TERMINATED									
HOURS OVERTIME (6) ELIMINATED									
MANHOURS SAVED FROM (4) MULTIPLE POSITIONS?									
OTHER DOLLAR SAVINGS (7) (Excluding Menpower), e.e., CONTRACT COSTS & UTILITIES			13,979						
(0)									
(6)									
(01)									
(11) TOTAL BOLLAR BAVINGS			13,979						
6 (1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect specific duties being		performed with additional manhours erails ble fequivalent manyears)	wel menhours eveile	ide (equivalent mar	yeard			

REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT

This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. (Cim repuisiony approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) 4. OTHER COORDINATION (Punctional Coordination of local level, e.g., Fec Eng. Log. Pers. etc.) 26. SUSMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project Initiator) 28. APPROVAL RECOMMENDED BY (MACOM/Agency) 20. OTHER REMARKS (Cont'd) 27. APPROVED BY 1 August 1982

DATE (YYMMDD)

FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE

AUTOVON

DATE (YYMMDD)

SIGNATURE

SIGNATURE

AUTOVOR

DATE (YYMMDD)

AUTOVON

SUBJECT RAAF EEAF

AEP NO 2900379000

REYNOLDS. SMITH AND HILLS
REMOVE Steam Coils
SHEET OF

DATE 5/21/90

CHECKER

CHECKER

DATE 6/12/90

DATE 6/12/90

ECO# SR-I-1

REMOVE STEAM COIL FROM A.C.S.R. DUCTWORK

Assumptions:

- 1. The 450 hp exhaust fan motors are oversized by 20%.
- 2. The total pressure on the Fan is 20 inches of water.
- 3. The efficiency of the fan and drive assembly is 65 %.
- 4. The efficiency of the fan motor is 85%.
- 5. There are three steam coils with I row and 14 fins per inch. The pressure drop across each coil is 0.75 inches of water.
- 6. The exhaust Eystem operates 24 hours per day, 260 days per year (6240 hrs/yr).

Current Energy Consumption:

Php = Motor hp - 1.2 = 450 hp = 1.2 = 375 Bhp

Annual energy use = $329 \text{ kw} \times 6240 \frac{\text{hrs}}{\text{yr}} = 2,052,960 \text{ kwh/yr}$ Annual energy use = $2,052.96 \frac{\text{Mwh}}{\text{yr}} \times 3.413 \frac{\text{MBtu}}{\text{Mwh}} = \frac{7007 \text{ MBtu/yr}}{\text{Mwh}}$ Annual energy cost = $2,052,960 \frac{\text{kwh}}{\text{yr}} \times 0.03026 \frac{\text{W}}{\text{kwh}} = \frac{462,123 \text{ /yr}}{\text{yr}}$

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
11	CORPORATI	ED	

BJECT		AEP NO
	ove Steam Coils	SHEET OF
SIGNER	W.T. Todd	DATE
	(4 N	DATE

*			
Additional	Energy	Consumptic	n:

There is no additional energy consumption required by this ECO.

Energy Savings:

Exhaust CFM = Bhp x Fau. Eff. x 6350 Total Pressure

CFM = 375 hp x 0.65 x 6350 = 77,390 cu.ft.

The reduction in total pressure by removing the steam coils would be:

TP = 0.75 in. H20/coil x3 coils = 2.25 in. H20

The reduction in Fan horsepower required is:

$$HP_r = \frac{CFM * TP_r}{Fan. EFF. \times 6350} = \frac{77390 \times 2.25}{0.65 \times 6350} = 42 hp$$

Energy Savings = 2 bldgs × 37 kw × 6240 hr/yr = 461,760 Kwh/yr

Energy Savings = 461.76 Mwh 3.413 MBtu = 1576 MBtu/yr

Annual cost savings = 461,760 Kwh × 0.03026 Kwh = \$13,973/yr

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS · PL	ANNERS
11	NCORPORAT	ED	

SUBJECT	AEP NO
Remove Steam Coils	
DESIGNER W.T. Todd	DATE
CHECKED	DATE

Cost for removing steam coils, replacing duction and adjusting fan drive = \$16,997 Refer to Construction Cost Estimate sheet for detailed itenization of costs. Simple Payback: ECO Payback = Cost = Savings	ECO Cos	<u>ts:</u>	ren percentari distributari, pena (1921) — incredidant pen	·		
Refer to Construction Cost Estimate sheet For detailed itenization of costs. Simple Payback:	Cost	For removi	ing stea	un coils,	replacing	ductu
Simple Payback:	and o	adjusting t	fan drivs	z = \$16,9°	17	
simple rayback:						
Eco Payback = Cost = Savings	R F	efer to Cor or detailed	istruction itemiz	Cost E	stimate :	sheet
· · · · · · · · · · · · · · · · · · ·					. 	

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1	CONSTRUCTION COST	TAMITE	Ε		DATE PREPARED 5/21	190	SHEET	+ of
PROJECT	ENERGY ENGINEERING	ANAL YS	S				ESTIMATE	
LOCATION							CODE A (No deergr E. B. (Preliminary d	
ARCHITE	CT ENGINEER						CODE C (Final dee ER (Specify)	ign)
DRAWING	REYNOLDS, SMITH AND	HILLS	A.E.	ATOR			HECKED BY	
	NA			W.	T. Todd		24	
Remo	ve Steam Coilsummary	QUANTI	UNIT	PER	LABOR	PER	TOTAL	TOTAL COST
		UNITS	MEAS	UNIT		UNIT	10122	
	Demolition, 72"	30	LF	2.70				81.00
Coil	Removal, 500 lb ea	1.5	Ton		592.50			592.50
	72" Stainless Steel	30	LF		930.00		1890.00	
Duct	insulation; ±", 1215	565	SF		604.55		293.80	
Duct i	ins. Jacket, Gal. Steel	30	LF	22.95			855.60	1544,10
Adiu	st fan, balance air		EA	15.0	150.00	25	25.00	175.00
<u></u>								
	Subtotal				3046.05		3064.40	6110.45
Loca	tion Adjustments			0.683	(965.60)	1.002	6.13	(959.47)
Sale	s Tax					4.5%	137-62	137.62
FICA	/Insurance			20%	416.09			416.09
<u> </u>								
	Subtotal							5704.69
Over	rhead	15%						855.70
Prof	•	10%						656.04
Perf	ormance Bond	170						72.16
Cont	ingency	10%						728.86
RAA	P Support	6%						481.05
	00							
Con	struction Cost	(for	each	buil	ding)		-	8498.50
Cox	istruction Cost	(For	th	o bu	ildings)			\$16,997.00
1								
		<u> </u>						
<_	urce:							
	ns Mechanical Co	x+ N	1	196	9 Raise	Costa		
ficea	43 MICHAMICAL CO		ala	, , , , e	1 Daye	-03 CS		

Telephone Call Confirmation

	Project No. 2900379 000
Local (L.D.) Placed	Rec'd Date
Bill Todd Conversed	With Everett Grubb /H. Hill
Of RAAP Maintenance Regard	
Mr. Grubb was not available	so I spoke with an
assistant about heat recover	·
* Solvent Condenser uses filt	teved water (not chilled water)
at 40 lbs pressure.	
* Steam coils are not u	scd. The steam values
	een shut off
Distribution:	

HUNTER Form 102

EYNOLDS, SMITH AND RCHITECTS ENGINEERS PLA INCORPORATED	uii i e	Steam Coils Todd	AEP NO
Means Mech		MATE BACKUp	
page			
12	Coil removal	500 lb each	\$395/ton
12	Dact Vemoval	72" wide	\$2.70 /LF
231	New Duct - 5. Ste	el 72" round	
	Mat = 35-31.5 x 32	+ 35 = 63.00/L	F
	Lab= (15,4-13,45) x 32	+15.40 = \$31.00/1	<u>-</u> F
171	Duct insulation		
	21xx1 = 2×3,14 × 3FE	+30Ft = 565 Eq.	.ft.
229	insulation jack	cet 74" Ø	
	gal, steel		
- ···	$mat = \left(\frac{13.95 - 11.65}{6}\right) \times$	38 + 13.95 = \$\frac{4}{28.5}\$	52/LF
	Lab = (13.45-11.95)	×38× 13.45 = \$22.9	75/LF
256	Fan adjustment	t (air balance)	\$175 each

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
- 11	CORPORATI	ED	

SUBJECT	AEP NO
	SHEETOF
DESIGNER B. Todd.	DATE
CHECKER	DATE

COST ESTIMATE BACKUP

Means Mech. page

12

Coil removal 500 lb each \$395/ton

Duct removal 72" wide \$2.70 /LF

12

231

New Duct - S. Steel 72" round

Mat = (35-31.5) x 32 + 35 = \$63.00 /LF

Lab= (15.4-13.45) x 32+15.40 = 31.00/LF

171

Duct insulation

2744 = 2×3,14 × 3Ft × 30Ft = 565 sq. Ft.

129

insulation jacket 74" Ø

gal, steel

mat = (13.95-11.65) x 38 + 13.95 = \$28.52/LF

Lab = (13.45-11.95) ×38 × 13.45 = \$22.95/LF

256

Fan adjustment (air balance)

\$175 each

C 1, AR 5-4

l August 1982

						1
DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proponent agency is OCA.	Y CAPITAL INVESTM ; the proponent agency is ^C		1. PROJECT NO.		REQUIREMENT CONTRC DD-M(R) 1561	TOBMAS TO
CDR, AMC (AMCRM-MP) 5001 Eisenhower Avenue Alexandria, VA 22333-0001	3. THRU:		* FROM: AMCCOM CDR, AMCCOTT Attn: AMSMC- Rock Island.	AMSMC-MGP-P (R) 7. COMMAND CODE Island. IL 61299-6000 W730KK	6. DOD COMP NAME Army 7. COMMAND CODE W730KK	6. DOD COMP CODE A 8. DATE
8. PROJECT TITLE		10. TYPE OF PRCJECT (Check one)	1	11. AMORTIZATION YEARS/MONTHS	ARS/MONTHS	
Replace Exterior Incandescents with Fluorescents (ECO GP-N-3)	ents with		OSD PIF PECIP	8 21,485	+ 15,770	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR 024	OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER. ATIONAL DATE			۔ ا
16 SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	Replace exterior incan fluorescent screw-ins.	Replace exterior incandescent floodlights with 13 watt compact fluorescent screw-ins.	int floodlights	with 13 watt	compact
Existing incandescent flood lights have an efficacy of about 15 lumens/watt. Fluorescents offer about lumens/watt. Fluorescents offer about lumens/watt. This is recommended in areas where a 25-percent reduction in lighting level is acceptable and the fixtures are non-explosion proof type.	d lights have a mmended in area xplosion proof	an efficacy of as where a 25-p type.	about 15 lumens ercent reductio	/watt. Fluore on in lighting	scents offer a level is accep	bout 50 table
18. SAVINGS DISPOSITION						
Savings are used to reduce	reduce energy costs.					
20. OTHER REMARKS (Continue on page 5, 1/ more space is needed)	we space is needed)					

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į				SUMM (ROUND O	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	VINGS DOLLAR)				
			Attack	h computation sheet id	A track computation sheet identifying the method and source of data for savings	nd source of data for a	عدزسوء		90	
				PROPOSED METHOD	METHOD			DIFFE RENCE/SAVINGS	SAVINGS	8× 71.7
* 5	SAVINGS	PRESENT	1ST YA	20 VR	3D VR	ATH YR	1ST VR	20 VR	3D VR	
EALARY/U OVERTIME	ALARY/LABOR/					·				
MATERIAL	LATERIAL/ UPPLIES	6,302	1,765	1,765	1,765	1,765	4,537	4,537	4,537	4,537
UTILITIES	TIES									,
MAINTE	AAINTENANCE/ IEPAIR	2,448	297	297	297	297	6,688	6,688	6,688	6,688
34	TRANSPORTATION									
3	LEASE COSTS									
SALV	SALVAGE/ TURN-IN									
ENE	ENERGY (Identity) Flactricity	10,168	1,085	1,085	1,085	1,085	9,083	9,083	9,083	9,083
8	CONTRACT COSTS								·	
P	OTHER (Identity)									
<u> </u>	TOTALS	18,918	3,147	3,147	3,147	3,147	15,770	15,770	15,770	15,770
					PRIORITIZATION	7				
48	INTERNAL RAI Divide estimate Besed on facto	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 21, 485 by average annual savings 15,770 = 1.36 factor. Divide estimated project cost 21, 485 by average annual savings 15,770 = 1.36 factor. Bessed on factor and number of years economic life of the project, select the IRR from Table H-3, App H, Ch. 5, AR 5-4	21, 485 by aver years economic life o	by average annual savings _ nic life of the project, select	15,770 = the IRR from Table	1.36 • H-3, App H, Ch. 6	factor. 5, AR 6-4 =	1.17	≸ IRR.	
12	SAVINGS TO INVESTME!	15.	X diac	ال	138,461	1 1	and divide by present value of investment	westment		
	(undiscounted) 21,4 (Based on economic life,	() 21,485	year, select die	sount factor from T	years, select discount factor from Table H-4, App H, Ch. 5, AR 5-4.	ı. 6, AR 6-4.				
(3)	Ì	NATE OF INVESTMENT PER MANPOWER SPACE (RIMS) Divide estimated project cost	OWER SPACE (RIMS) by used in this compu	MS) NA by number of manpower space savings	er space savings	•		RDAS.		
-										

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL			
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, FY FUNDS BUDGET ACTIVITY REQUIRED OR PROGRAM ELEMENT
•	•	3			,
u) 13 Watt PL Compact Fluorescents		. 59.85	359	21,485	
(2)					
(6)					
(9)					
(y)					
(S) TRANSPORTATION (Equipment delibery)					
(7) EQUIPMENT MODIFICATION			12 21		
(8) EQUIPMENT INSTALLATION					
(9) MAINTENANCE CONTRACT ²			, (a) 1, (b) 1, (c) 1, (c)		
(10) FACILITIES MODIFICATION ³					
(11) TRAINING					
(12) OTHER (Speelly):					
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	ME OPERATIONAL			21,485	
(14) TOTAL AMOUNT OF FUNDING REQUESTED	UNDING REQUESTED IN THIS PROPOSAL			21,485	
(15) TOTAL AMOUNT OF FUNDING REQUIRED FR	UNDING REQUIRED FROM OTHER SOURCE			0	
(16) TOTAL (8am of (14) + (15) abour)	16) above)			21,485	
I and the state of	and to the				

INot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

³ Normally not OPA funded

Used to compute emoritration in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

1 August 1982

ri a		Ĭ,	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS)				
		SAVINGS				REAPPLICATION OF SAVINGS	SAVINGS		
ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
•	•	U	79	e. FROM	ر. TO	f. FROM	h. TO	L FROM	To
REQUIREMENTS AND (1) AUTHORIZATIONS ELIMINATED	a								
(2) REQUIREMENTS ONLY ELIMINATED									·
BORROWED MILITARY (3) MANPOWER RELEASED									
OVERHIRES OR TEMPORARIES (4) TERMINATED									
HOURS OVERTIME (6) ELIMINATED									
MANHOURS SAVED FROM			2,140						
OTHER DOLLAR BAVINGS (7) (Excluding Memperer), a.g., CONTRACT COSTS & UTILITIES			13,630				ANSTERNATION OF THE SECOND OF		
(0)							•		
(8)									
(01)									
(11) TOTAL BOLLAR SAVINGS			15,770						·
6 (1) US Graded (2) US Wage Board (3) DHFN (4) 1HFN (5) Officer (6) WO	Reflect specific duties being	ic duttes being poi	performed with additional manhours available (equivalent manyears)	wal manhours evail	de (equinekal mas	years			

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REGULATORY APPROVAL/COORDINATION	AL/COORDINATION	
INVESTMENT STATEMENT	STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	lacilities. This investment is in accordance with established investment plans y constraints.	· Dajo
	•	
(Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.)	Na.) (Ex. New Shrt, TAGO Approved, etc.)	
, OTHER COORDINATION (Punctional Coordination at local level, e.g., Fac Eng. Log. Pers. efe.)		
5. SUBMITTED BY (Typed name, grade and side of Subordinate Command/Agency or Project	SIGNATURE (YYMADD)	(MDD)
infilteer)	AUTOVON	
	SIGNATURE DATE (YYMNDD)	(дами
28. APPROVAL RECOMMENDED BY LANCOM/Agress/	NOAOLOX	
FOR USE BY HQDA ON OSD PIF PROJECTS ONLY	SD PIF PROJECTS ONLY	(GQMM
27. APPROVED BY		
	AUTOVON	
20 OTHER REMARKS (Confd)		

aep no 290 0379 000 RAAP Lighting Projects REYNOLDS, SMITH AND HILLS T. Told RCHITECTS • ENGINEERS • PLANNERS GP- N-3 WITH COMPACT REPLACE EXTERIOR INCANDESCENTS PLUORESCENT FLOODS Many buildings at RAAP are list with inefficient incardescent lighting. This ECO analytes the replacement of exterior incand. floods with 13WPL compact flood sectrofits which Acrem into the incondescent sockets. This type of project is suitable for non-explosion proof fixtures in areas where a 20-30% reduction in light level is acceptable. Costs and Daly areas operating 3 Shifts day, 5 days look were considered. incardescent lighting was compiled from the building survey data (page 3). It is assumed that 50% of the exterior fextwees on this list are non-explanion proof floods. Number of fixtures = 0.5 (717) = 359 836 kul x 0.603413 MBtu x 359 = 1024 MBtu Eurogy cost Savings = \$25.30 , 359 fixtures = yr-fixture Mail & Labor cost savings = \$ 18.63 x 359 9083 + 6688 = \$15,771/4V Total cost Surings = Project cost = \$66.73/ findure x 359 = \$23,956 Construction cost = 23,956/1.115 = \$21, 485

EYNOLDS. SMITH AND HILLS RCHITECTS · ENGINEERS · PLANNERS INCORPORATED	SUBJECT RAAP Liq. Screening Chapter F. To	odd	DATE	
GR-N-2 Reduce 1:41+ 1000	10 - limited	application	o to replace	exterior
GP-N-3 Reduce light leve 150 W Cheandesc	ote with 13 W	tel fluore	cent serewin	retrofits
130 W Generalization	and the later	7		
- Assume original ligh	t levels can be red	buced by 20	-30%	
- Assume non-explos	ion proof appli	ication		
Energy savings = (1	50 W-16W) x	24 hr x 260 day	Seys = 836	twf gr
E. a. e. e. e. e. e.	- 836 Kurh	\$0.03076 -	\$ 25.30	
Energy cost savings	X	jush	ym	
Labor 4 mat l cost savy	11 1 750 W	10 000		
_ [(\$2,11 model + \$1.20	labor x 0.683) / 1	7.88 model +	\$1.95 labor x 0.66	3) x 6240h
750 hr		10,00	of hir	J yr
	\$ 18.63			9.
	yr			
Total lost savings =	= \$25.30 + 1	18.63 = 9	143.93	
Ü	y	yr -	yr	
	32 for fixture p			
Layor cost = \$1.20		0	•	+20%)
Project cost =[(1.045 (\$ 37.32)	+(1,2 x \$ 0.	98) x 1.66 =	+66.73
Simple payback = \$	666.73 = 1 3.93/w	.5 yr <1	0 yr ≥ veco	mmended
•	t :	1 1		

77	Q.	

SUBJECT	AEP NO
	SHEETOF
DESIGNER PFH	DATE 10/29/90
CHECKER	DATE

QRIP Cale :

Current energy costs:

150 W 224 hr x 260 dn = 1000 x 35 laups x #0.3026/kwh = = #10,168/gr.

Current material : labor costs:

cost /Jamp + 359 + 6240hrs

2.11 +1.2 × 0.63 × 359 × 6240 = \$8750/yr

New energy coats:

16 * 24 * 260 = 1000 + 359 * 0.03826 = \$1085/gr.

New matil & labor cook

7.83 + 1.95 × 1.68 × 359 × 6240 = \$ 2062/y-

Labor savings

(1.2 × 0.68 = 1.95 × 0.68) × 359 × 6240 = \$ 2140/gr

For fluorescents, replace the lamp only.

RSH	_
	B

SUBJECT		 AEP NO		
		SHEET	OF	
DESIGNER	74	DATE		
CHECKER		 DATE		

Current mail costs:

New mal'l costs:

(arrent labor:

New Pator:

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Solvent Recovery House	Sol. Recovery, 8-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green. C-Line	3	20	60
	SG Curing Hse Carpet Rolls		10	5	. 50
	Machine and Saw House		1	6	6
	Dry House #4 (Cure Grain)		7	8	56
9334 -15	Blender House		1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
	Boiling Tub House		3	50	150
		NC, B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3	30	90
3513 -00	C-1 Press & Cutting House Forced Air Dry House	Green, C-Line	3	50	150
4912 -40	Forced Air Dry House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
4912 -03	MK 43 Sawing and Inhibiting	Cast Prop. (Rocket)	1	4	4
	Small Grain Mold Assembly		1	7	7
	Inspect/Clean NG Tanks *		1	21	21
	TOW Launch Saw House		1	8	8
5008 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	1st R P	1	20	20
7113 -00	Roll House (Rolled Powder)	1st R P (F-Line)	1	130	130
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST	ESTIMAT	E		DATE PREPARED		SHEET 4	of 10
ENERGY ENGINEERING	ANALYS	IS				R ESTIMATE	
RADFORD ARMY AMMUN	· · · · · · · · · · · · · · · · · · ·		 			CODE A (No design :	e(gn)
ARCHITECT ENGINEER					i -	CODE C (Final designment)	(e e i gn)
REYNOLDS, SMITH AND	HILLS	A.E.				CHECKED BY	
GP-N-3				r. Toôd			
Turani to flucy flood Summary	QUANT	UNIT	PER	TOTAL	PER	TOTAL	
	UNITS	MEAS.			UNIT		
Replace in candescent	359	livt.	0.98	352	37.32	13398	15750
floods with 13W PL							
fluorescent floods							
71 101	100/					603	603
Sales Tax	4.5%			70	1	002	
FICA/In Jance Subtotal	10.0%		:	422		14001	
	15.0%			120			
Oyenhead Profit	10.0%						
Performance Bond	1.07						
	6.0%						
Herales Support Contingency	10.0%						1953
Construction Cost							21486
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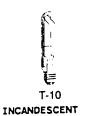
GP-N-3 p. 5 of 10

NCANDESCENT LAMPS















	A-21	G-16	5½ R-40	2,10,210					G-40	3	R-30
Bulb	Base	Prod. Code	Lamp Ordering Code	Volts	Pkg.	Fila- ment Desgn (MOL	LCL (In.)	Rated Avg. Life Hours	App. Init Lum.	DESCRIPTION See Incandescent footnotes pg. 46
100 W/ G-40	ATTS (Cont Medium	inued) 39627	100G40/W	120	24	CC-6	6:%		2500	1280	Pearl (White)
G-40	Medium		100G40/W	6PK 120	6	CC-6	615/18		2500	1280	Globe Pearl (White) Globe, Moonglow
G-40	Medium	13046	100G40/W/L	120	24	CC-6	61% ₁₆		4000	1220	Pearl (White) Globe
A-23 A-23 A-23 A-23 A-21	Medium Medium Medium Medium Med.(BB)	18610 18594 18632	100A/B 100A/G 100A/G 100A/R 100A/R 100A21/TS	120 120 120 120 120	120 120 120 120 120	CC-6 CC-6 CC-9	51% 51% 51% 51% 51% 4 %	 2 1/18	750 750 750 750 3000	1280	*Blue *Green *Orange *Red ClearTraffic Signal. Rated Watts: 98. BDTH (78)
A-21 A-21	Med.(88) Med.(88)		100A21/TS 100A21/SP	130 120	120 120	C-9 C-5	4 1/1	2 1/16 3	3000 200	1280 1340	ClearSpotlight
A-23 A-23	Med.(BB) Medium Med.(BB)	18449	100A21/4SP 100A23 100A23/20	120 120 120	120 120 120	C-5 CC-6 CC-6	4 1/1 515/16 515/16	3 4 ½ 4 ½	200 750 1000		Light I.FMed- ical Spotlight Inside Frost ClearCommer-
G-16%	S.C.Bay.	18717	100G16½/29SC	120	60	CC-1	3 3	1 ³/e	200	1660	cial Oven ClearSpotlight. BDTH (7,86,99)
G-16% G-16% R-	D.C.Bay. D.C.Bay. Medium	18723	100G16½/29DC 100G16½/29DC ==100R/FL	120 130 120	60 60 24	CC-1: CC-1: CC-6	3 3	1 3/6 1 3/8	200 200 2000	1660 1660 1190	Reflector flood. I.f. (4,35,56)
R-40 R-40	Medium Medium		*=100R/FL 100R/SP	130 120	24 24	CC-6			2000 2000	1190 1190	Refl. SpotLight
T-8½	Medium		100T8½/9	120	24	CC-1	3 5 ½	3	50	1920	I.F. (4,35,56) MicroscopeANSI: EDR (22,86,99)
T-10 (HRG)	D.C.Med. Ring	18905	100110/7	6	24	C-6	5½	2 3/15	50		ffContour Pro- jector ANSI: CPS
T-10 (HRG)	Med.Pref	18907	100T 10P	6	24	C-6	5 1/4	2 1/16	50		(1,86.99) ffContour Pro- jector ANSI: CPT (1,86.99)
A-23 PAR-38	Medium Med.Side		100A23 100PAR38/FL	12 12	120 12	C-6	51% 4 % 5		1000	1400	Inside Frost (53) PARMine Flood (58)
(HRG) PAR-38 (HRG)	Prong Med.Skir (BB)	18824	100PAR38/2FL	12	12	C-6	5 ½		1000	1400	PARFlood (14.56.96)
	Scr.Term	>3 93 94	100PAR64	6	12	C-6	4		. 50		CeilometerVery Narrow Spot. Filament shielded
R-30 (HRG)	Med.(BB)	>39503	100R30/CL	12	24	C-6	5 1/1		2000	1200	Reflector Flood Clear (4,14,53)
T-8	S.C.Bay.	18881	100TB/1SC	20	24	cc-6	3	2 3/15	50		Clear-Contour Map ANSI: BZA (8,31,61,86,94)@
A-21 A-21	Medium Med.(88)		100A/RS 100A21/3	30 32	120 120) C-5	5 1/4 4 3/6		1000 500	1610	I.FRough Serv. ClearLocomotive Headlight (13)
A-23 A-23 PAR-46 (HRG)	Medium Med.(BB) Scr.Term (BB)	> 17906	100A 100A/BB 100PAR46	34 34 60	120 120 12	CC-2	51%6 51%6 2V 3 %	4 1/16	1000 1000 800	2160 2160 	I.FTrain Mine Locomotive Headlight (71)
A-21 A-21	Medium Medium	17983	100A 100A	230 250 230-	120 120 120	C-7≜	51/4	317/15	1000 1000 2500	1280 1280	Inside Frost " I.FExt. Serv.
A-21 A-21	Med.(BB)		100A/99 100A/RS	250 250 250	120				1000	960	I.FRough Serv.
									 -		-

Medium

> New product listing.

In "base up" use, heat eventually may deteriorate paper-lined or plastic sockets.

Source W x H: 4.5 x 3.0mm. Burn base up.

If Filament offset .100" +-.030" from base axis.

ENERGY SAVING in deep down lights consider the 75ER30 lamp shown on page 23 . The resulting at savings are shown on page 5.

GENERAL ELECTRIC LAMPS

NCANDESCENT LAMPS





INCANDESCENT

R-40

ulb	Base	Prod. Code	Lamp Ordering Code	V	olts/	Pkg.	Fila- ment Desgn	MOL (In.)	LCL (In.)	Rated Avg. Life Hours	App. Init Lum.	DESCRIPTION See Incandescent footnotes pg. 46
	Med.Side	(inued) 41966	150PAR46/3NSP		125	12	CC-1	3 4		2000	1500	Narrow Spot (11,56,58,96)
HRG)	Prong Med.Side	41968	150PAR46/3MFL		125	12	CC-1	3 4		2000	1500	Medium Flood (11,56,58,96)
	Prong Scr.Term	19517	150PAR46		125	12	C-13	3 1/4		1000		Mine Locomotive Headlight
HRG) AR-46 HRG)	(BB) 3-Prong	>35327	150PAR46/TS		115	12	cc-e	4	-•	6000		Traffic Signal Stippled Reflector Tapioca
	Med.Side Prong	44933	150PAR/3VWFL		125	12	C-13	4 1/15		2000		lens cover (2) † MineWide Flood (56,58,96)
	Med.Side	19497	150PAR/4		125	12	C-13	4 % 5		2000		1 MineSpot (56,58,96)
	Prong Med.Skir	19509	150PAR/5		125	12	C-13	5 1/16		2000		f MineSpot (14,56.96)
HRG) AR-46 HRG)	(BB) Scr.Term (BB)	19 518	150PAR46/3		175	12	C-13	3 1/4		800		Mine. Locomotive Headlight (71)
-40	Medium	19797	**150R/FL		120	24	cc-6	6 %		2000	1900	Reflector Flood ANSI: DWC
-40	Medium	>16445	150R/FL-1	6PK	120	30	cc-6	6 %6		2000	1900	(4,14,35,56) Standard Re- flector Flood (4,14,35,56)
-40_	Medium	19799	**150R/FL		130	24	c c-6	6 %		2000	1900	Reflector Flood (4,14,35,56)
2-40	Med.(BB)	14715	150R/FL/CVG		130	24	c c-6	6 %		2000		>>Refl. Flood COV-R-GUARD ^M (4,35,56,83)
?−40	Medium	19783	15OR/SP		120	24	cc-e	6 %		2000	1900	Refl. SpotLight I.F. (4,14,35,56)
₹-40	Medium	>16446	150R/SP-1	6PK	120	30	CC-6	6 %		2000	1900	Standard Reflector Spot (4,14,35,56)
-40	Medium	19785	15OR/SP		130	24	cc-€	6 %		2000	1900	Reflector Spot Light I.F. (4,14,35,56)
40	Medium	19844	150R/A		120	24	CC-€	6 %		2000		ReflectorAmber (14,35,36)
-40	Medium	19823	150R/B		120	24	cc-€	6 %		2000		ReflectorBlue (14,35,36)
40	Medium	19827	15OR/BW		120	24	cc-€	6 %		2000		ReflectorBlue- White (14,35,36)
-40	Medium	19831	150R/G		120	24	c c-€	6 %		2000	••	ReflectorGreen (14,35,36)
:-40	Medium	19835	150R/PK		120	24	cc-e	6 % 6		2000		ReflectorPink (14,35,36)
`-40	Medium	19841	150R/R		120	24	cc-€	6 %		2000		ReflectorRed (14,35,36)
1-40	Medium	19851	150R/Y		120	24	cc-€	6 1/15		2000		ReflectorYellow (14,35,36)
`-40	Med.(88)	4 1627	150R40/PL	6PK	120	24	CC-€	6 %		2000		Reflector Plant Light*Gro and Sho* (4,14,56)
₹-40	Medium	44674	150R40/TB		120	24	cc-€	6 6 %		2000		Jewelry Spot Re- flector Transpar- ent Daylight Blue
:-40	Medium	44675	150R40/TB		130	24	cc-e	6 9/15		2000		(4,14,35,56,76) Jewelry Spot Reflector Transparent Daylight Blue
·-25	Med.(BB)	19372	150P25/10		120	60	C-5	4 3/4	3	200	2100	(4,14,35,56,76) Light I.FSpot- light. Hard glass button

New product listing.

> Teflon* Coated. Teflon is a registered trademark of Dupont.

Operating position horizontal with locating lug up or down, and with lamp supported by bulb rim.

** FOR ENERGY SAVING in deep down lights consider the 75ER30 lamp shown on page 23. The resulting savings are shown on page 5.

	Lighting	\top		DAILY	MAN-			BARE	COSTS	لــــــــــــــــــــــــــــــــــــــ	TOTAL	ł
16	6 100 Lighting	C	REW	CUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OEP	L
1600	90 watt	1	Elec	.30	26.670	C	5,140	645		5,785	6,600	14
1650	135 watt		1	.20	40		6.905	970		7,875	9,025	ļ
1700	180 watt	\neg	1	.20	40		7,308	970		8,278	9,475	1
	Quartz line, clear, 500 watt			1.10	7.270		1,872	175		2,047	2,325	ı
1750	1500 watt	-	+	.20	40		3,427	970		4,397	5,200	Ī
1760	Incandescent, interior, A21, 100 watt			1.60	5		173	120		293	370	ı
1800		\dashv	+-	1.60	5		(211)	(120)		331	410	I
1900	A21, 150 watt			1.60	5		227	120		347	430	l
2000	A23, 200 watt	-	+-	1.60	5		330	120		450	540	1
2200	PS 30, 300 watt	ł		1.60	5		576	120		696	810	
2210	PS 35, 500 watt ()	-	+-		6.150	\vdash	1,525	150		1.675	1,900	1
2230	PS 52, 1000 watt	- 1		1.30			2,382	150		2,532	2.850	ı
2240	PS 52, 1500 watt	-	+	1.30	6.150	-		150		525	630	t
2300	R30, 75 watt			1.30	6.150		375	150		558	670	1
2400	R40, 150 watt	+	+-	1.30	6.150		408			716	840	1
2500	Exterior, PAR 38, 75 watt			1.30	6.150		566	150		675	795	ı
2600	PAR 38, 150 watt	\dashv	+	1.30	6.150	$\vdash \vdash$	525	150			2,375	ł
2700	PAR 46, 200 watt	ı	-	1.10	7.270		1,928	175		2,103 2,368	2.675	ı
2800	PAR 56, 300 watt			1.10	7.270	\vdash	2,193	175			695	┨
3000	Guards, fluorescent lamp, 4' long			1	8		375	195		570	905	ı
3200	8' long		<u> </u>	.90	8.890	<u> </u>	535	215		750	340	1
0010	RESIDENTIAL FIXTURES				1		}					ľ
0400	Fluorescent, interior, surface, circline, 32 watt & 40 watt		1 Elec	20	.400	Ea.	48	9.70		57.70		┨
0500	2' x 2', two U 40 watt	- 1		8	1		66	24		90	110	ì
0700	Shallow under cabinet, two 20 watt			16	.500		45	12.15		57.15		4
900	Wall mounted, 41, one 40 watt, with baffle			10	.800		41	19.40	1	60.40	L	İ
2000	incandescent, exterior lantem, wall mounted, 60 watt			16	.500		36	12.15		48.15		4
2100	Post light, 150W, with 7' post			4	2		104	49	ŀ	153	185	١
2500	Lamp holder, weatherproof with 150W PAR			16	.500		16	12.15		28.15		4
2550	With reflector and quard		T	12	.667		31	16.15	1	47.15		1
2600	interior pendent, globe with shade, 150 watt	į.	1	20	.400		78	9.70		87.70	100	4
0010	TRACK LIGHTING									1		ľ
0080	e 9		1 Elec	6.70	1.190	Ea.	33	29		62	79	4
0100	Frack, 1 circuit. 4' section	\neg	\Box	5.30	1.510		48	37		85	105	١
0200	12' section gr	i	ļ	4 40	1.820		81	44		125	155	4
0300	3 circuits. 4' section	\neg	\top	6.70	1.190		36	29		65	82	١
0400				5.30	1.510		48	37		85	105	4
			\dashv	4.40	1.820	_	88	44		132	160	1
0500	12' section g		-	16	.500	1 1	12	12.15	il	24.15	31	┙
1000	End cover	1	\neg	24	.333	1	1.98	8.10		10.08	14.0	5
1100	Feed kit, stem mounting, 1 circuit	l		16	.500		16	12.15	5	28.15	35	┙
1200	3 circuit	$\neg \uparrow$	_	16	.500		16	12.1		28.15	35	-
1300	Electrical joiner for continuous runs. 1 circuit	1		32	.250		6.55	6.00	5	12.60	16.1	0
2000			+	32	.250	1	12.10			18.15	22	ı
2100	3 circuit			16	.500	1 1	47	12.1	E .	59.15	70	
2200	Fixtures, spottight, 150 PAR	+	+	16	.500	_	101	12.1		113.15	130	
3000	Wall washer, 250 watt tungsten halogen	ĺ		16	.500	4 1	102	12.1	1	114.15		
3100	Low voltage, 2% watt, 1 circuit		\dashv			_	109	12.1		121.15		
3120	3 circuit	<i>m</i>	. •	16	.500	1 1	102	1 16.19	- 1		•	

166	Lighting											
			Т	DAILY	MAN-			BARE (COSTS		TOTAL	
1 66	6 100 Lighting	CRE	w	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OEP	
T	175 watt metal halide	1 Ek	эс	8	1	Ea.	479	24		503	565	135
35 5100	250 watt metal halide			8	1		500	24		524	585	ļ
5110 5120	150 watt high pressure sodium		\neg	8	1		535	24		559	625	ŧ
5130	250 watt high pressure sodium			8	1		556	24		580	645	ł
5140	72"H 18" sq., 400 watt metal halide			8	1		525	24		549	615	l
5150	250 watt high pressure sodium			8			556	24		580	646	ł
5160	400 watt high pressure sodium	j +	-	8	1	•	581	24		605	675	l
5190	Portable rectangle, 6" high 13.5" x 20"	1_	_				000	16.15		309.15	345	i
5200	175 watt metal halide	1 5	вс	12	.667	Ea.	293	16.15		330.15	370	
5210	250 watt metal halide	1	+	12	.667		314	16.15 16.15		351.15	390	1
5220	150 watt high pressure sodium	1	-	12	.667		335 360	16.15		376.15	420	
5230	250 watt high pressure sodium	₩	-	12	.667		365	16.15		381.15	425	1
5240	8" high 18" x 24", 400 watt metal halide	1	-	12 12	.667 .667		376	16.15		392.15	435	ł
5250	250 watt high pressure sodium	╂┈┼	+	12	.667	-	398	16.15		414.15	460	1
5260	400 watt high pressure sodium		İ	12	.667		324	16.15		340.15	380	i
5270	Portable square, 15" high 13.5" sq., 175 watt metal halide	+	\dashv	12	.667	+	376	16.15		392.15	435	1
5280	250 watt metal halide			12	.667		360	16.15		376.15	420	1
5290	150 watt high pressure sodium	╂╌┼	-	12	.667		386	16.15		402.15	450	1
5300	250 watt high pressure sodium Pendent 16" round/square, 175 watt metal halide			3.20	2.500		355	61		416	480	1
5400	250 watt metal halide	1	\neg	2.70	2.960		370	72		442	515	ł
5410				2.40	3.330		398	81		479	555	1
5420	400 watt metal halide 150 watt high pressure sodium		_	3.20	2.500		398	61		459	525	1
5430	250 watt high pressure sodium			2.70	2.960		428	72		500	575	4
5440	400 watt high pressure sodium	\top		2.40	3.330	1	454	81		535	620	ł
150	400 Water ingit prosected sounding	1							<u> </u>		<u> </u>	
140 0010	LAMP8	T							Ì		 	140
0080	Fluorescent, rapid start, cool white, 2' long, 20 watt	1 8	lec	1	8	Ç	348	(95)	<u> </u>	543	670	4
0100	4' long, 40 watt			.90	8.890	1	198	215		413	535	1
0120	3' long, 30 watt			.90	8.890		442	215		657	1,325	-
0150	U-40 watt	1	ĺ	.80	10		874	245		1,119	615	Ī
0170	4' long, 35 watt energy saver			.90	8.890	\vdash	270	215		485 833	995	1
0200	Slimline, 4' long, 40 watt			.90	8.890		618	215		822	990	1
0300	8' long, 75 watt	Д.		.80	10	+	577	245	 	848	1,025	1
0350	8' long, 60 watt energy saver	-		.80	10		603	245	1	965	1,150	1
0400	High output, 4' long, 60 watt	4_	-	.90	8.890	1	750	215 245	 	1,020	1,200	7
0500	8' long, 110 watt	ł		.80	10	1	775 1,285	215		1,500	1,725	ļ
0520	Very high output, 4' long, 110 watt		-	.90	8.890	_	1,285	275	+	1,560	1,825	7
0550	8' long, 215 watt	1		.70	11.430	1 1	2.142	645		2,787	3,300	1
0600	Mercury vapor, mogul base, deluxe white, 100 watt		+-	.30	26.670 26.670	_	1,663	645	1	2,308	2,775	7
0650	175 watt	1		.30	26.670		2,968	645		3,613	4,225	
0700	250 watt	- -	+	.30	26.670	_	2,340	645	1	2,985	3,525	7
0800				1	1	1	5,100	970		6,070	7,025	ᆚ
	400 watt			1 20	1 An						5,075	
0900	1000 watt	1	<u> </u>	.20	26,670			645	1	4,394		ı
0900 1000	1000 watt Metal halide, mogul base, 175 watt	_	<u> </u>	.30	26.670		3,7 49 4,712	645 645		4,394 5,357	6,125	_
0900 1000 1100	1000 watt Metal halide, mogul base, 175 watt 250 watt	-	<u> </u>	.30 .30	26.670 26.670		3,749				5,775	$\frac{1}{2}$
0900 1000 1100 1200	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt			.30 .30	26.670		3,7 49 4,712	645		5,357 5,031 10,864	5,775 12,300	
0900 1000 1100 1200 1300	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt			.30 .30 .30	26.670 26.670 26.670		3,749 4,712 4,386	645 645		5.357 5,031 10.864 10.930	5,775 12,300 12,400	1
0900 1000 1100 1200 1300 1320	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens			.30 .30	26.670 26.670 26.670 40		3,749 4,712 4,386 9,894	645 645 970		5,357 5,031 10,864 10,930 10,238	5,775 12,300 12,400 11,600	
0900 1000 1100 1200 1300 1320 1330	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt			.30 .30 .30 .20	26.670 26.670 26.670 40 40	0	3,749 4,712 4,386 9,894 9,960 9,268 4,712	645 645 970 970		5,357 5,031 10,864 10,930 10,238 5,357	5,775 12,300 12,400 11,600 6,125	
0900 1000 1100 1200 1300 1320 1330	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt			.30 .30 .30 .20 .20	26.670 26.670 26.670 40 40 40	0	3,749 4,712 4,386 9,894 9,960 9,268	645 645 970 970 970		5.357 5,031 10.864 10.930 10.238 5,357 5,516	5,775 12,300 12,400 11,600 6,125 6,300	
0900 1000 1100 1200 1300 1320 1330 1350 1360	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt			.30 .30 .20 .20 .20	26.670 26.670 40 40 40 26.670 26.670	0	3,749 4,712 4,386 9,894 9,960 9,268 4,712	645 645 970 970 970 645		5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704	5,775 12,300 12,400 11,600 6,125 6,300 6,525	
0900 1000 1100 1200 1300 1320 1330 1350 1360 1370	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt			.30 .30 .30 .20 .20 .20 .30	26.670 26.670 26.670 40 40 40 26.670 26.670 26.670	0 0 0	3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871	645 645 970 970 970 645 645		5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025	5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875	
0900 1000 1100 1200 1300 1320 1330 1350 1360 1370 1380	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt 150 watt 250 watt			.30 .30 .20 .20 .20 .30 .30	26.670 26.670 26.670 40 40 40 26.670 26.670 26.670	000000000000000000000000000000000000000	3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871 5,059	645 645 970 970 970 645 645 645 645		5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025 6,372	5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875 7,250	
0900 1000 1100 1200 1300 1320 1330 1350 1360 1370 1380 1400	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 150 watt 250 watt 400 watt			.30 .30 .20 .20 .20 .30 .30 .30	26.670 26.670 40 40 40 26.670 26.670 26.670 26.670 26.670 40	000000000000000000000000000000000000000	3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871 5,059 5,380	645 645 970 970 970 645 645 645 645 970		5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025 6,372 14,322	5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875 7,250 16,100	
0900 1000 1100 1200 1300 1320 1330 1350 1360 1370 1380	1000 watt Metal halide, mogul base, 175 watt 250 watt 400 watt 1000 watt 1000 watt, 125,000 initial lumens 1500 watt Sodium high pressure, 70 watt 100 watt 150 watt 250 watt			.30 .30 .20 .20 .20 .30 .30 .30	26.670 26.670 40 40 40 26.670 26.670 26.670 26.670 40	000000000000000000000000000000000000000	3,749 4,712 4,386 9,894 9,960 9,268 4,712 4,871 5,059 5,380 5,727	645 645 970 970 970 645 645 645 645		5,357 5,031 10,864 10,930 10,238 5,357 5,516 5,704 6,025 6,372	5,775 12,300 12,400 11,600 6,125 6,300 6,525 6,875 7,250	



CONTRACTOR PRIC

9 of 10

STDL PKG54

PKGS WGHTW LIST

10 11

CODE

10513T

10514T

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10923

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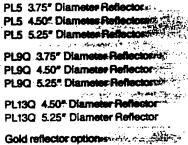
10925

11324

11325

DESCRIPTION CITY: (LBS.): PR

REFLECTA-STAR"—COMPACT FLUORESCENT FLOODLIGHT-SERIESBIR



available in all units

Ç.	10	्राग्द्र ी1 ^	64.32 64.32	
:	10	11	73.14	
	10	11	73.14	¥
		11 11	73.14	
	10	14,447	74.64	
	10	11	74.64	
		- 12.00 mg		4 تهيد

5.25

1.50

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88.32

88.32

10003-P*
10003-W
10003-WF
10003-PF
10003-CF
10003-C

-G







Ultraviolet Filter Insert Disk	10	1 .	4.35	2.18
Socket extender—extends unit 1.25"	25	4	4.95	2.48

ADD:

"IMPORTANT: To order optional lenses or filters, please specify reflector size. The last digit of the product code number for the Reflect-A-Star Series indicates the reflector diameter. "3" indicates 334," "4" indicates 41/2" and "5" indicates 51/4,"

RECESSED DOWNLIGHT KIT®

5111325 5121325 5131325



Clear Reflector Trim **Gold Reflector Trim Black Reflector Trim**

12 70 176.64 176.64 12 70 176.64 12 70

13Quad: 900 lumens as per Bruce Pelton

*The recessed downlight kit consists of a frame-in kit, reflector trim in clear, gold or black Alzak® aluminum and a Reflect ayar ya jiyaya bila 1994 w number 11325 with standard reflector and lenses

"Fixture price includes lamp. "PL" or "PLQ" refers to lamp type only. GE, Osram; Philips or Sylvania lamps will be supplied at the

MicroLampr-FLUORESCENFADAPTORSERIE

A PROPERTY OF THE PARTY.

20510 20710 20910	PL5 PL7 PL9	50 28 50 28 50 28	28.17 14.09 · · · · · · · · · · · · · · · · · · ·
20 920 21 320	PLQ9 PLQ13	50 - 28 50 - 30	39.03 19.52 39.03 19.52

FLUORESCENT REPLACEMENT LAMPS***

40510 40710 40910 41310	5W Fluorescent "PL" lamp 7W Fluorescent "PL" lamp 9W Fluorescent "PL" lamp 13W Fluorescent "PL" lamp	50 4 50 4 50 5 50 6	9.00 4.50 9.00 4.50 9.00 74.50 9.75 4.88
40920 41320	9W Fluorescent "PLQ" lamp 13W Fluorescent "PLQ" lamp	50 / 7 50 8	15.75 7.88 15.75 7.88

CONDITIONS OF SALE

ORDER ACCEPTANCE

Orders are subject to approval at Lumatech corporate headquarters.

Prices are subject to change without notice. Lumatech reserves the right to accept and bill all orders at prices in effect at the time of the shipment.

TERMS

Net 30 days on approved credit only. 11/2% per month will be assessed on past due invoices. Any account submitted for collection is subject to reasonable attorney fees and costs.

FREIGHT

Transportation costs will be pre-paid and billed F.O.B. Oakland, California.

No merchandise may be returned without prior written authorization. Authorization may be requested within 30 days from the date of original shipment. All returns will be subject to a minimum handling and factory inspection charge of 25% of invoiced amounts, plus freight, except on products considered by Lumatech to be defective in workmanship and materials.

CLAIMS FOR DAMAGE OR LOSS IN SHIPMENT

It is the responsibility of the consignee to file a claim with the transportation company in the event of lost or damaged merchandise. Immediately upon receipt of the shipment, the consignee should check for loss or damage, in the event such has occurred the consignee should file a claim with the transportation company promptly.

CANCELLATIONS

Orders are not cancelable except on payment for all costs incurred, engineering work performed, any materials purchased or commitments made on the part of Lumatech. Lumatech reserves the right to assess a minimum cancellation charge equal to 25% of the original purchase price of the order placed by the customer.

PRODUCT SPECIFICATIONS

Subject to change without notice.

CATALOG ERRORS

Every effort is made on the part of Lumatech Corporation to provide accurate pricing, dimensional and physical description information, etc. in our literature and price lists. However, as this information is subject to change without notice, we cannot accept the responsibility for any loss or damages due to informational errors in our publications. We invite your inquiry regarding up to date information.

MINIMUM ORDER

Minimum net invoice amount is \$50.00. Any order under \$50.00 is subject to a \$10.00 handling charge.

LIMITED WARRANTY

The REFLECT-A-STAR® and MicroLamp® series fixtures are warranted to be free from defects in workmanship and materials, as manufactured, for a period of three years from the date of original invoice. Lamps are warranted for 90 days only.

Our invoice covers only replacement or repair at our factory of the defective part(s), to the original purchaser, and excludes any responsibility for labor or freight expense incurred by the purchaser or others, for servicing such claim during the warranty period. Lumatech reserves the right to issue credit, repair or replace defective merchandise, at our option, upon receipt of written notification by the original purchaser of the alleged defect, within the warranty period. Lumatech further reserves the right to examination of the alleged defective product, or proof satisfactory to Lumatech of the defect. This limited warranty is in lieu of all other responsibility for labor costs in connection with the installation, removal or replacement of warranted products, or for any consequential... damages. Lumatech further reserves the right to refuse to honor the above warranty for any product(s) altered, improperly installed, or installed in application for which not intended.

For Authorized Dealer Contact:



DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT For use of this form, see AR 8-4; the proponent agency is OCA.	ESTMENT PROGRAMS LEY IS OCA.	1. PROJECT NO.		REQUIREMENT CONTROL SYMBOL DD-M(R) 1561	NTROL SYMBOL
CDR, AMC (AMCRM-MP) 5001 Eisenhower Avenue		4.FROM: CDR, AMCCOM Attn: AMSMC-MGP-P (R)	(R)	6. DOD COMP NAME Army 7. COMMAND CODE	6. DOD COMP CODE A 8. DATE
Alexandria, VA 22333-0001	10, TYPE OF PRCJECT (Check one)	1 STATIO	11. AMORTIZATION YEARS/MONTHS	N OUNTHE	
Install Turning Vanes in Boiler Ductwork (ECO GP-X-4)	aiseo	OSD PIF PECIP	36, 630	+ 21,998	X 12
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER-	(Project Cost)	(Average Annual Sarbigy)	l
024	25 yrs.	•	1.7 or (years)	(months)	. (amortization)
16. SUBMITTING UNIT(S) 16. UNIT ID CODE	E 17. PROJECT DESCRIPTION	NO!			
Administrative Contracting WOLLAA Office Radford Army Ammunition Pt. Radford, VA 24141	Replace the gas stream w	Replace the existing square corner ductwork in Power House 1 gas stream with rounded elbows.	ner ductwor	k in Power Hou	use 1 exit
14. DETAILED JUSTIFICATION		* + + + + + + + + + + + + + + + + + + +	יים יי דימי	nd draft fanc	Renlacind
Existing square corner ductwork increased energy use for both lorced drait and induced drait lans. the inside corner with rounded elbows will reduce the pressure drop and save energy.	ased energy use to will reduce the p	r both Torced urait ressure drop and sav	and induction of the control of the		מ ס כ ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב
19. SAVINGS DISPOSITION					
Savings are used to reduce energy cos	ts.		:		
20. OTHER REMARKS (Continue on page 5, 1/ more space is needed)					

21a					SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	DOLLAR)	vings			
			Attach	Attach computation sheet id	tation sheet identifying the method and source of	(C 33)(MC D)		DIFFERENCE/SAVINGS	/SAVING8	
SAVINGS	,	PRESENT		PROPOSED METHOD	SA OF	4TH YR	1ST VR	2D YR	3D YR	4TH YR
BREAKOUT IALARY/LABOR/	¥ 0	METHOD	E .							
MATERIAL/ BUPPLIES										
עזורעופּ										
MAINTENANCE/	3									
TRAMBPORTATION	ATION									
LEASE COSTS	,								,	
BALVAGE/ TURN-IN									1	- 1
ENERGY (Identity) Electricity	icity	33,780	9,792	9,792	9,792	9,792	21,988	21,988	21,988	21,988
CONTRACT COSTS	costs								·	
OTHER (Identity)	(4th									
TOTALS	9	33,780	9,792	9,792	9,792	9,792	21,988	21,988	21,988	21,988
					PRIORITIZATION					
(1) INTER	RNAL RAT le estimate d on factor	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost Besed on factor and number of year	36,630 by averally years economic life of	by average annual savings _	INTERNAL RATE OF RETURN (IRR) Divide settimated project cost 36,630 by average annual savings 21,988 1.67 factor. Divide settimated project cost 36,630 by average annual savings 21,988 21,988 P. Ch. 6, AR 6-4 Based on factor and number of years economic life of the project, select the IRR from Table H-3, App H, Ch. 6, AR 6-4	1.67 ta	factor. 5, AR 5-4 =	35 * IRR.	쓡	
(2) SAVIE	INGS TO IN	Maltiply annual sevings 21,988	1 1	11.	37 - 250,004	ŀ	_and divide by present value of investment	vestment		
Par de	(undiscounted) (Based on economic life	nomic life 25	years, select discount	count factor from T	_P/1. lactor from Table H-4, App H, Ch. 6, AR 6-4.	6, AR 5-4.				
(3) NAT	E OF INVE	MATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	WER SPACE (RIMS)	NA				RIMB		
Divid	de estimat	Divide estimated project cost	1 kg	by number of manpower space savings	rer apace savings					
<u>.</u>	HOMEL IC	Manpower requirement tennes of the second se								
-										

	COST SOB PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				1
22.				1000	APPROPRIATION, FY FUNDS	SON
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY OF		OR PROGRAM ELEMENT REQUIRED	IMED
		3,663	10	36,630		
Kounded Elbow Ductwork						
(6)						
(b)						
(9)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION ³						
(11) TRAINING						
(12) OTHER (Specify):					·	
(18) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	OME OPERATIONAL			36,630		
(14) TOTAL AMOUNT OF FI	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			36,630		: 1 V [*] /4
(16) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			0		
(16) TOTAL (3um of (14) + (15) above)	(15) above)			36,630		
The state of annian and annian and the state of the state	pmietr				-	

I Not to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

³Normally not OPA funded

 $^{^4}$ Used so compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

1 August 1904		Š	UMMARY OF SAV	SUMMARY OF SAVINGS (MANFOWER AND DOLLARS)	AND DOLLARS)				
		BAVINGS				REAPPLICATION OF SAVINGS	SAVINGS		
ITEMS	NO. MPR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA AND LINE	IND LINE	FUNCTION CODE	N CODE
9	4	3	9	e. FROM	f. TO	F. FROM	. 10	L FROM	10
REQUIREMENTS AND (1) AUTHORIZATIONS ELIMINATED	Q.								
(2) REQUIREMENTS ONLY ELIMINATED									
(3) MANPOWER RELEASED							·		
OVERHIRES OR TEMPORARIES (4) TERMINATED							·		
HOURS OVERTIME (6) ELIMINATED									
MANHOURS SAVED FROM (4) MULTIPLE POSITIONS?									
OTHER DOLLAR SAVINGS (?) (Excleding Manpount), e.b., CONTRACT COSTS & UTILITIES			21,988				- 44.1 m - 11 22.		
(0)							•		
(8)									
(01)									
(11) TOTAL BOLLAR SAVINGS	7 7		21,988						
6 (1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Entitled	Reflect speci	fic duties being pe	rformed with addit	Reflect specific duties being performed with additional manhours available (equivalent manyears)	be lequivakent man	veary			-

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REGULATORY APPROVAL/COORDINATION	/AL/COORDINATION	
24. INVESTMENT STATEMENT	BTATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	facilities. This investment is in accordance with established investn ry constraints.	sent plenning.
	•	
(Cite regulatory approvals, e.g., TAGO Contro	approvels, e.g., TAGO Combol No.) (Ex. New Start, TAGO Approved, etc.)	
h OTHER COORDINATION (Punckand Coordination at local level, e.g., Fac Eng, Log, Pera etc.)		
25. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project	SIGNATURE	DATE (YYMMDD)
Initiatory		AUTOVON
SA APPROVAL RECOMMENDED BY (MACOM/Approx)	SIGNATURE	DATE (YYMMDD)
		AUTOVON
NO AUDH YR 3811 A CR		TO CONTRACT OF THE PARTY OF THE
27 APPROVED IV	SIGNATURE	CONTRACTOR (CONTRACTOR)
		AUTOVON
20. OTHER REMARKS (Confd)		

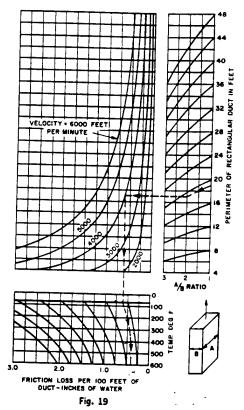
ECO#GP-X-4 INSTALL TURNING VALUES IN BOILER DUCTS PRESSURE DROP WITH EXISTING SQUARE CORNER ASSUME: 5280 FT/min, 300°F EXIT GAS TEMP. ASPECT RATIO (YO) =1 FROM FIG 20 (ATTACHED) PRESSURE DROPIS O.B IN.W.C. PRESSURE DRUP WITH 24" RADIUS BEND IN LIEW OF SAVARE CORNER ASSUME 6'X6' DUCT. $R/D = \frac{24/12}{6} = .333$ FROM FIG 20 AP = 0.28 IN. W.C. FAN ENERGY SAVED VOLUME = 6'x6' x 5280 FT/min = 190,000 ACFM ENERGY = (190,000) (0.8 - 0.28) × 746 = 16.56 KW LOAD FACTOR ON FAN 72532 Kwh/yr x 3413 Kwh X10-6 METU - 248 MBTU/yn Typically 3 boilers operate in writer and 2m Assuming 2.5 boilers and 4 elbours perboiler ques 75 * 4 * 243 MBtn/yr = 2480 MBTn/yr RSH.

SUBJECT		AEP NO	
		SHEETOF	
DESIGNER	PFH	DATE	
CHECKER		DATE	

 $\frac{\text{DRIP Cale is}}{\text{Surrent energy use}} = \frac{(190,000)(0.8)}{6356\times0.7} \times \frac{7116}{1000} \times \frac{8760}{2} \times 0.03026 = \frac{$3373}{2373} \text{ subow}$ $\frac{3378}{3378} \times 10 \text{ elbows} = \frac{$33,730}{33,730} \times \frac{1}{3}

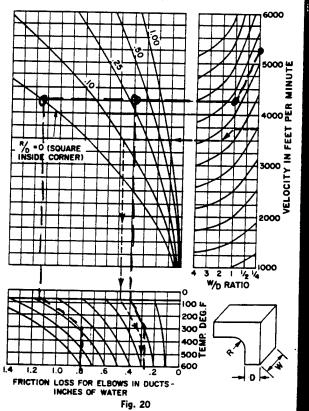
FRICTION LOSS IN RECTANGULAR DUCTS

All of the losses are figured for unlined steel ducts at 70 F and A/B $\,$ ${\sf ratio}=1.$ Correct for other temperatures and ratios as shown.



FRICTION LOSS IN PLAIN RECTANGULAR ELBOWS

All of the losses are figured for unlined steel elbows at 70 F and W/D ratio = 1. Correct for other temperatures and ratios as shown.



73

72

	24" RADIUS REND MATIC COST
	ASSUME: 7 gage PLATE, 6 ST WIDE DUCT., 2/LASTEEL
	AREA
	24 /N X 15T X2T X 6 FT = 18.85 FT bend
	7
	weight
	7 gage platé weighs 7.5 LBS/ft2
	18.85 ft bend x 7.5 LRS fr = 141 LRS bend
	STEEL PLATE COSTS ABOUT \$2/LR FARRICATED
i	* MEANS. SPECIALTY STEEL
	141 LBS/bend x #2/LB = \$282/bend.
•	

The second secon

CONSTRUCTION COST	ESTIMA	TE		DATE PREPARE	0	SHEE	IT OF
PROJECT ENERGY ENGINEERING	ΔΝΔΙ Υς	15			BASIS FOR	RESTIMATE	
LOCATION					1	CODE A (No de DE B (Prolimina	seign completed)
RADFORD ARMY AMMUN	ITITON	PLANT		`		CODE C (Final	-
REYNOLDS, SMITH AND	D HILLS	A.E	.P., II	NC.	□ o T ×	ER (Specify)	
DRAWING NO.		ESTIM	ATOR	Falloy	C	HECKED BY	utchins
0	QUANT	ITY		LABOR	M	ATERIAL	
ROUNDED DUCT SUMMARY CORNER.	.OH ETINU	UNIT	PER	TOTAL	PER	TOTAL	COST
BEND COST MATIL	1	ea			282	282	282
LABOR Q9	3	days	346.32	1039			1039
REMOVE Exicting							
CORNER CREW Q9	•5	days	346.32	173		281	455
TOVAL				1212		282	1494
LOCATION			.683	82 <i>8</i>	1.002	282	1110
SALES TAX			1.00	828	1.045	295	1123
FICA			1.20	994	1.00	295	1289
OVERHEAD 15%	·						1482
PROFIT 10%							1631
BONO 1%							1647
CONTINGENCY 10%							1812
Hercules Les	~						1920
TOTAL PER R	1 Bow					•	1920
- 1 · 0 · 5 · M		7					
Five boilers ? 4 elbo	05 Dec	h		•		· · · · · · · · · · · · · · · · · · ·	X20
							\$ 20 1
TOTAL CONSTRUC	7 101	C00	1				\$38,400
	_						-
						. <u>.</u>	

DOCHMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT	CAPITAL INVESTA	MENT PROCEAMS	1. PROJECT NO.			
For use of this form, see AR 5-4; the proponent agency is OCA.	the proponent agency is)W-QQ	DD-M(R) 1661
	з. ТНВО:		мссом		6. DOD COMP NAME Army	e. DOD COMP CODE
5001 Eisenhower Avenue Alexandria, VA 22333-0001			Attn: AMSMC-MGP-P Rock Island, IL 61	MGP-P (R) IL 61299-6000	7. COMMAND CODE W730KK	8. DATE
9. PROJECT TITLE		10. TYPE OF PRCJECT (Check one)		11. AMORTIZATION YEARS/MONTHS	EARS/MONTHS	
Modify Boiling Tub Heating Method (ECO NC-X-1)	Method		OBD PIF TECIP	8.924	+ 8.630	; >
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	occur	13, ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	ı	i	L
024		25 years		1.03	(months) (amo	(amorts at lon)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE	17. PROJECT DESCRIPTION	NOI			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	A closed heat replace the s	closed heat exchanger will be installed on <u>one</u> boili pplace the steam percolation method currentl <u>y</u> in use.	l be installed on method curr	on <u>one</u> boiling entl <u>y</u> in use.	g tub to
The steam percolation method now Using a closed heat exchanger to	used heat	ws steam to tub contents	escape from the boiling tub by will greatly reduce this heat	boiling tub by duce this heat	a "puffing" action. loss.	ction.
19. SAVINGS DISPOSITION						
Savings are used to reduce energy costs	energy costs.			:		

C 1, 4R E-1

~	1 August 1982									
ĮĘ.	214.			SUMA (ROUND O	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	AVINGS IT DOLLAR)				
_			Ana	Attach computation sheet is	usation sheet identifying the method and source of data for savings	and source of data for	savings			
					METHOD			DIFFERENCE/SAVINGS	E/SAVING8	
	BREAKOUT	PRESENT	1ST YR	20 YR	30 YR	4TH VR	18T YR	2D VR	30 YA	ATH YR
140	SALARY/LABOR/ OVERTIME									
	MATERIAL									
<u> </u>	עזונעונג									
135	MAINTENANCE/ REPAIR									
<u> </u>	TRAMBFORTATION									
	LEASE COSTS									
19-	EALVAGE/ TURN-IN								\	
	Coal	23,100	14,470	14,470	14,470	14,470	8,630	8,630	8,630	8,630
<u> </u>	CONTRACT COSTS								·	
14	OTHER (Identify)									
	TOTALS	23,100	14,470	14,470	14,470	14,470	8,630	8,630	8,630	8,630
					PRIORITIZATION	2				
	(1) INTERNAL RAT	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 8	8,954 · by average an	rage annual savings	8,630	1.04	factor.	105		
	Bess on facto	r and number of y	Based on factor and number of years economic life of the p	of the project, select	roject, select the IRR from Table II-3, App H, Ch. 5, AR 5-4	e H-3, App H, Ch. !) *		8 IRR.	
		THE CITY OF THE PARTY OF THE PA								
	Multiply annua	Maltiply annual sevings 8, 630	• I	13.	34 - 115,124	ı	and divide by present value of investment	vectment		
	(Based on economic life	somic life 25	y ear, ad-	_	Je/l. lactor from Table H-4, App H, Ch. 5, AR 5-4	1. 6, AR 6-4.				
3/	3	STMENT PER MANR	RATE OF INVESTMENT PER MANPOWER SPACE (RINS)	NA						
91		Divide estimated project cost	by	by number of manpower space savings	er space savings	•		RD48.		
	(Menpower res	juivalents cannot be	(Manpower requiralents cannot be used in this computation.)	tation.)						

2	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL				
EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS REQUIRED
	•	3	•			
a) Closed Heat Exchanger		8,924		8,924		
(2)						
(9)						
(F)						
(9)						
(6) TRANSPORTATION (Equipment delbery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²						
(10) FACILITIES MODIFICATION ³					·	
(11) TRAINING						
(12) OTHER (Specify):					•	
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	ME OPERATIONAL			8,924		
(14) TOTAL AMOUNT OF FUNDING REQUESTED	JNDING REQUESTED IN THIS PROPOSAL			8,924		\$ 74 4
(16) TOTAL AMOUNT OF FUNDING REQUIRED	UNDING REQUIRED FROM OTHER SOURCE			0	1 () () () () () () () () () (
(16) TOTAL (3um of (14) + (16) above)	18) above)			8,924	e e e e e e e e e e e e e e e e e e e	
I Not to exceed 10% of equipment cost for ORIP projects	proken					

^INot to exceed 10% of equipment cost for QRIP projects

3 Normally not OPA funded

²Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenence.

 $^{^4}$ Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

ជ			S	UMMARY OF SAV	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
			SAVINGS				REAPPLICATION OF SAVINGS	* SAVINGS		
	ITEME	NO. MPR OR MHR	TYPE PERS ⁶	DOLLARS	PROGRAM ELEMENT	ELEMENT	TDA PARA AND LINE	AND LINE	FUNCTION CODE	N CODE
		•	·	•	. FROM	ر 10	g. FROM	A. TO	L FROM	, TO
3	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
3	REQUIREMENTS ONLY ELIMINATED									
3	BORROWED MILITARY MANPOWER RELEASED									
દ	OVERHIRES OR TEMPORARIES TERMINATED									
3	HOURS OVERTIME ELIMINATED									
ĝ	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
3	OTHER DOLLAR SAVINGS (Excluding Memboury), a.g., CONTRACT COSTS & UTILITIES			8,630						
€_								•		
Ē										
62										
αn	TOTAL BOLLAR SAVINGS			8,630						
3/91	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Refiect specific duties being		formed with addition	performed with additional manhours evailable (equivalent manyears)	ble (equivalent man	(kuse)			

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DATE (YYMNDD) DATE (YYMNDD) DATE (YYMMDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVON AUTOVON (Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) FOR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE & OTHER COORDINATION (Punctional Coordination at local level, e.g., Fee Eng. Log. Pers. etc.) 25. SUBMITTED BY (Typed name, grade and little of Subordinate Command/Agency or Profect Initiator) 26. APPROVAL RECOMMENDED BY (MACOM/Apricy) 20. OTHER REMARKS (Conf'd) 27. APPROVED BY

RS	H
	®

SUBJECT	AEP NO
	SHEETOF
DESIGNER ST	DATE 9-24-90
CHECKER	DATE

ECO # NC -X - 1 INSTAL BOILING TUB HEAT EXCHANGER

Hercules dates shows hailing tube Consume 1408 LBS /HR of 40 psic STEAM for a tub on hail.

HEAT CONSUMPTION

1408 LBS/HR/TUB X1175 BTY/B = 1.654 mBTU/HR/TUB

106 BT/MOTU

OTHER DATA SHOWS A TUBIS ON BOIL FOR ABOUT 75% of its cycle

ANNUAL HEAT CONSUMED

1.654 MBTU/HR/TUB X 8760 x .75=10,870 MBTU/yearhue

PERCENT HEAT SAVED BY CONDENSING STEAM

$$% - \frac{h_{fg}}{h_{f}} \times 100$$

$$= \frac{919}{1175} \frac{\text{GTY}_{fg}}{\text{GTY}_{fg}} \times 100 = 78.2\%$$

ANNUAL HEAT SAVED @ TUBS

10,870 MBTU/gear/TUB x . 782 = 8501 MBTU/yr/TUB

ANNUAL COM SAVING

RSH.

SUBJECT	AEP NO
	SHEET 2OF
DESIGNER 64	DATE
CHECKER A	DATE

NC-X-1

Electricity price differential costs:

\$1.11/mstu 40#5TM. x 8501 mstu = \$9436 /yr /4UB

RSH	
MC-X-1	

SUBJECT		AEP NO
		SHEET <u>3</u> of
DESIGNER	87	DATE 9/25/90
CHECKER	ØK.	DATE

Chiculate # of tubs # used each year 27,9 ×106 # NC/yr = 30,000 LBS NC/TUB CYCLE = 930 TUB CYCLES Yr

930 TUB CY/4r X100 HK/cy = 10.6 TUBS & 11 TUBS.

assuming 85% AVAILABILITY

11 tubs = 12.9 ~ 13 Tubs.

RAAP COAL ENERGY SAVINGS

11,221 MBTU / 41/108 × 11 TUBS = 123,431 mBTU COAL/47 123,431 * 1.61 = \$198,724/yr.

Electricity Price Differential Costs:

8501 MBtu * #1.11/MBtu *11 tuls = #103,797

RAAP NET SAVINGS \$ 198,724-103,797 = \$ 94,927/yr

RSH	,
	₿

SUBJECT		AEP NO
		SHEET 4OF
DESIGNER	GF.	DATE
<i></i>	70DR	

NC-X-L

SIMPLE PAYRACK

$$\frac{4_{1/5,993}}{94,927} = 1.2 \text{ yrs}$$

For QRIP:

TOTAL COAL USED PERTUS

$$COST = #115,993/5 = = #8924$$

CONSTRUCTION COST	ESTIMAT	Έ		DATE PREPARED		SHEET	OF
ROJECT ENERGY ENGINEERING	ANALYS	IS				R ESTIMATE	
RADFORD ARMY AMMUN						CODE A (No deerg	
ARCHITECT ENGINEER					I	CODE C (Final del THER (Specity)	பகும்
REYNOLDS, SMITH AND	HILLS	A.E.				CHECKED BY	<u> </u>
ECO# CONC-X-	- [Gallon .	,	14	
PERC. LINE H/X SUMMARY	QUANTI	TY	PER	LABOR	PER	MATERIAL	TOTAL
		MEAS	1	TOTAL	UNIT	TOTAL	COST
HEAT EXCHANGER							
3" SS 150 LB FLANGE	4	ea	29.00	116	129,15	517	633
S\$ 150 LB 4X3 REOVER	2	ca	30.00	60	100.00	200	260
3" SCH BO 316 PIPE	20	P		172	57.28	1145	1317
4" sch 40 316 BIPE	30		9,05	181	35.56	707	888
		'			ļ		
Pump							
mecit	1	ea	88	88	1500	1560	1648
ELEC (means pg 277)	/	ea	430	430	290	290	720
	-				ļ		
INSULATION					ļ		
4" pipe - 2"+HK	20	I=T	2.99	60	5.57	LCI	171
SUB TOTAL (ONE TUR)				1107		45-30	5637
5 7085			1107	5335	4530	22050	28185
LOCATION FACTOR			.683	37 <i>80</i>	1.002	22695	26475
SALES TAX			1	37 <i>80</i>	1,048	23716	27496
FICA INS			1.2	4536	1,00	23716	28252
OVER HEAD 15%		<u> </u>					32490
PROFIT 10%							35739
BOND 10%							36 09 6
CONTINGENCY 10°/0							39706
Hercules 6º10							42088
DESIGN FEE 604							44613
TOVAL							44613
13 Tubs	17/5						#115,994
·							
うのいととなり 1789 1	EANS	1					

OSD PIF

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proponent agency is OCA.	Y CAPITAL INVESTMEI; the proponent agency is OC.		1. PROJECT NO.		REQUIREMENT C DD-M()	REQUIREMENT CONTROL SYMBOL DD-M(R) 1661
2.10: HQ. DA (EACA-RMP)	S.THRU: CDR, AMC (AMCRM-MP)	- Wb)	CDR, AMCCOM		6. DOD COMP NAME Army	6. DOD COMP CODE A
	Suui Elsennower Alexandria, VA	ower Avenue VA 22333-0001	Attn: AMSMC-MGP-P (K) Rock Island, IL 61299-6000		V. COMMAND CODE W73QKK	9. DATE
8. PROJECT TITLE		10, TYPE OF PRCJECT (Check one)	Check one)	11. AMORTIZATION YEARS/MONTHS	ARS/MONTHS	
Install Variable Frequency Drives on Plant Water Pumps (ECO GP-B-4)	Drives on [ORIF	X 080 PIF T PECIP	185,735	+ 96,994	× 51
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR 0.24		13, ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Project Cout)	(Average Annual Savings)	Serings) (Na Mas)
		15 yrs.		1.9 or (years)	(months)	(amortization)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE 17	17. PROJECT DESCRIPTION	NOI			
Administrative Contracting Office Radford Army Ammunition Pt. Radford, VA 24141	WOLLAA	Install variable the water pumped	able frequency mped will matcl	Install variable frequency drives on the water supply pumps the water pumped will match the water required.	water supply p uired.	umps so that
currently, water is pumped from plant usage of about 14,000,000 drives would allow the existing	from the New River at a 0,000 gallons per day.	iver at a cons er day. The r reduce flow to	ew River at a constant rate of about ns per day. The remainder is return to reduce flow to match the demand.	the New River at a constant rate of about 24,000,000 gallons per day, with a gallons per day. The remainder is returned to the river. Variable frequency pumps to reduce flow to match the demand.	gallons per c iver. Variabl	day, with a le frequency
19. BAVINGS DISPOSITION				:		
20. OTHER REMARKS (Continue on page 5, if mos	page 6, if more space is norded)					

7,240 190,246 7,240 190,246 17,240 190,246 185,735 by average at mober of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic life of the geograph of the string state of years economic state of years eco	PROPOSED METHOD 2D VR 3D	citying the method and	special short itentifying the method and source of data for savings	ings			
PRESENT 18T VR 190. 19	2D VR	THOD			DIFFERENCE/SAVING8	/SAVING8	
190 190		30 VR	4TH VR	1ST VR	2D VR	3D VR	ATH YR
CE ATION ATION ATICITY ATICITY ATICITY ATION A			.	·			
CE /							
CE 190							
Parion							
190,246 190,							
COSTS COSTS COSTS LE 287,240 190,246 LE 287,240 190,246 ANAL RATE OF RETURN (IRR) LE 287,240 190,246 LE 287,240 190,246 LE 287,240 190,246 LE 287,240 190,246 LE 287,240 190,246 LE RANAL RATE OF RETURN (IRR) ANAL RATE OF RETURN (IRR) LE 287,240 190,246 ANAL RATE OF RETURN (IRR) RANAL RATE OF RETURN (IRR) ANAL RATE OF RETURN (IRR) BO SECOND (IRR) ANAL RATE OF RETURN (IRR) ANAL RATE OF RETU							
ty 287,240 190,246 287,240 190,246 287,240 190,246 nated project cost 185,735 by sverage an ector and number of years economic life of the sinvestment ratio (201) and (201)						`	
190,246 287,240 190,246 ATE OF RETURN (IRR) Lated project cost 185,735 by average are ctor and number of years economic life of the NINVESTMENT RATIO (IV.) 96,994 X discount factor	190,246	190,246	190,246	96,994	96,994	96,994	96,994
AATE OF RETURN (IRR) Instead project cost 185,735 by average at factor and number of years economic life of the TO INVESTMENT RATIO (2/1) TO INVESTMENT RATIO (2/1) 96,994 X discount factor							
INTERNAL MATE OF METURN (IRR) Divide estimated project cost 185,735 by average at Based on factor and number of years economic life of the savings to investment matio (4/1) SAVINGS TO INVESTMENT MATIO (4/1)							
INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 185,735 by average as Based on factor and number of years economic life of the SAVINGS TO INVESTMENT RATIO (2/1)	190,246	190,246	190,246	96,994	96,994	96,994	96,994
INTERNAL RATE OF RETURN (IRR) Divide estimated project cost Besed on factor and number of years economic life of the savings TO INVESTMENT RATIO (2/1) SAVINGS TO INVESTMENT RATIO (2/1) SAVINGS TO INVESTMENT RATIO (2/1)		PRIORITIZATION					
Based on factor and number of years economic life of the gavings TO INVESTMENT RATIO (4/1)	9 annual savings	96,994	1.91 fe	factor. 5. AR 5-4 =	72 % IRR.	쁔	
SAVINGS TO INVESTMENT RATIO (4/1)	he project, select tr	project, select the likin hom table in o, App		,			
7 /	1 1	851,607	_and divide by present value of investment	sent value of in	vetment		
secount.		_8/1. factor from Tuble H-4, App H, Ch. 6, AR 6-4	5, AR 6-4.				
(3) RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	NA	•			RTM8.		
Divide estimated project cost by number	by number of manpower space savings	space savings					

	ANDITAL OPERATIONAL	COME OPERATIONAL				
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	QUANTITY	TOTAL COST	APPROPRIATION, BUDGET ACTIVITY OR PROGRAM ELEMENT	FY FUNDS
•	•	v	•	•		,
w 600 hp Variable Freq. Drive		. 97,590	-	97,590		
(2) 400 hp Variable Freq. Drive		66,109	<u></u> 1	66,109		
(3) 100 hp Variable Freq. Drive		22,036		22,036		
(3)						
(9)						
(6) TRANSPORTATION (Equipment delibery)						
(7) EQUIPMENT MODIFICATION						
(8) EQUIPMENT INSTALLATION						
(9) MAINTENANCE CONTRACT ²			12+ 12- 13- 13- 13- 13- 13- 13- 13- 13- 13- 13			
(10) FACILITIES MODIFICATION ³						
(11) TRAINING						
(12) OTHER (Specify):						
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	ME OPERATIONAL			185,735		
(14) TOTAL AMOUNT OF FUNDING REQUESTED	NDING REQUESTED IN THIS PROPOSAL			185,735		
(16) TOTAL AMOUNT OF FUNDING REQUIRED FI	NDING REQUIRED FROM OTHER SOURCE			0	74 w	
(16) TOTAL (8um of (14) + (15) above)	8) above)			185,735		
	and de parties					

INot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

³Normally not OPA funded

Used to compute amortization in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

ផ			69	BUMMARY OF SAVINGS (MANFOWER AND DOLLARS)	INGS (MANPOWER	AND DOLLARS)				
			8A VINGS				REAPPLICATION OF SAVINGS	SAVINGS		
	ITEMS	NO. MPR OR MHR	TYPE PERS ⁶	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA AND LINE	IND LINE	FUNCTION CODE	4 CODE
		•	c	78	e. FROM	ر to	F. FROM	то то	L FROM	10
$\hat{\boldsymbol{s}}$	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED			·						
8	REQUIREMENTS ONLY ELIMINATED									
(6)	BORROWED MILITARY MANPOWER RELEASED									
9	OVERHIRES OR TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
દે	MANHOURS SAVED FROM MULTIPLE POSITIONS?									
æ	OTHER DOLLAR SAVINGS (Excluding Menpower), e.g., CONTRACT COSTS & UTILITIES			96,994						
€										
ê		:								
(01)							·			
an	(11) TOTAL BOLLAR SAVINGS			96,994						
2999995	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO (7) Enlisted	Reflect specific	dutes being po	Reflect specific duties being performed with additional manhours available (equivalent manyears)	wal manhours eveils	ble (equivalent man)	(eart)			

REGULATORY APPROVAL/COORDINATION	AL/COORDINATION	
A INVESTMENT STATEMENT	TATEMENT	
Total 100 Atl		
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	with existing equipment or facilities. This investment is in accordance with established investment planning. ions, and all other regulatory constraints.	ot plenning.
	•	
(Cits regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.)	No.) (Ex. New Start, TAGO Approved, etc.)	
A OTHER COORDINATION (Punctional Coordination at local lawi, e.g., Fac Eng. Log, Pers. etc.)		
and the second of the second of the second s	SIGNATURE	DATE (YYMMDD)
(addictor)	יאר	AUTOVON
	SIGNATURE	DATE (YYMMDD)
36. APPROVAL RECOMMENDED BY (MACOM/Agincy)		
FOR USE BY HODA ON OSD PIF PROJECTS ON LY		
27. APRIOVED BY		DATE (TIMEDD)
		AUTOVON
		·
20. OTHER REMARKS (Confd)		

REYNOLDS. SMITH AND HILLS ARCHITECTS • ENGINEERS • PLANNERS INCORPORATED	DESIGNER PF	4	DATE 5/31/90
Eco # GP.	B-4		
Install vario	ble frague	umps drives	in main
1. Calculate cu	rrent ener	zy use	
Current pro lurbine pun 1-400 hp be aurent aver	etice is to rep plus 1- poster pum age flow ro	operate 100 hp des p in comb vie is 24 m	1-600 hp p well and ination. The william gal/da.
Turbine pur	up i		The second second second second second second second second second second second second second second second se
kw= voilte	· amps · v 3	/1000	
= 230	0.127.13	11000 =	506 kW
Deep well	oump:		
10 Wb = 27	600 · 23 · V3	5/1000 =	92 kW
Boooter pu	up	··· -	
kWB = 2	200-130·V3	5/1000 =	495 kW
Total kw	= 506+92	+ 495 =	1093 KW
Average au	nual usage	= 1093 · 376	0 = 9.574,680 KWh
			¥0.03= \$287,240
·			413 = 32,678 M/Stu

SUBJECT......AEP NO......

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS	· ENGINEE	RS • PL	ANNERS
•	NCORPORAT	ED	

SUBJECT	AEP NO
	SHEET OF
DESIGNER	DATE
CHECKER	DATE

2. Calculate every savings

Calculate septem head for following current

$$2h_p = 1093 \text{ kW}$$
 $3h_p = 0.70$
 $3h_p = 0.95$
 ehp =
$$bhp/nm$$
 $kw = 0.75 * ehp$
 $bhp = whp/np$ $ehp = kw/0.75$
 $ehp = whp/nm/np$

$$enp = \underbrace{H \cdot Q}_{2960 \cdot \eta_p \cdot \eta_m} = \underbrace{kW}_{0.75}$$

$$H = \frac{1093 \cdot 3960 \cdot 0.70 \cdot 0.95}{16,667 \cdot 0.75}$$

Assume static heat is about 150 feet.

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
- 11	NCORPORATE	ED	

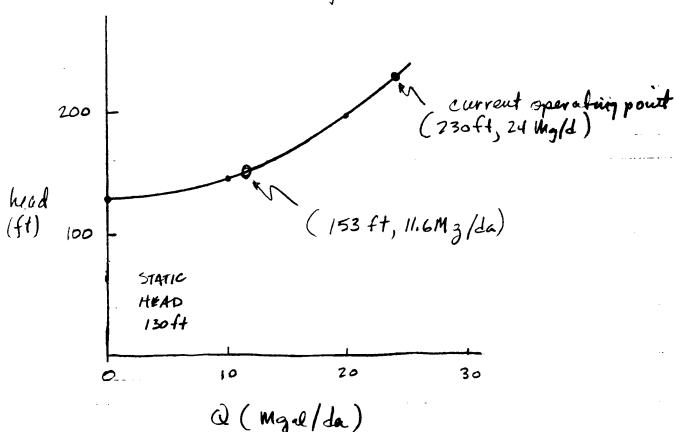
HEET _____OF....

DESIGNER ..

DATE

DATE

Water Plant Egitur Curve



 $= \frac{1}{2} \frac{$

= 10,940 mBth (electricity)

Project No. (9)

Project No. <u>290-0379-000</u> (904) 281-0394

D. Hu	<u>itchiis</u>	Placed Conv e . Сотр.	versed with	Mark	Riffle	<u>. </u>
MR	gave bus	dget estima	ater for	variable	speed dri	<i>Ues</i>
	00 hp		\$ 60	derials 0,000		
	50 hp	\$ 2000		7,000		
Distribution:						

CONSTRUCTION COST I	ESTIMA	ΓE		DATE PREPARED		SHEET	OF
ENERGY ENGINEERING	ANALYS	IS	<u> </u>		BASIS FO	CODE A (No deals	
RADFORD ARMY AMMUN	ITION	PLANT		_	_	DOE & (Proliminary	leaign).
REYNOLDS, SMITH AND	HILLS	A.E.	P., II	IC.		CODE C (Final dec THER (Specity)	i gu
ECO# GP-B-		ESTIM	ATOR	Hutchins		CHECKED BY	
	QUANT	ITY	1.	LABOR	r	MATERIAL	_
VARIABLE SPEED SUMMARY DRIVES	NO. UNITS	UNIT	PER	TOTAL	PER	TOTAL	COST
1-600 hp VSD		ea		2000		60,000	62,000
1-400 hp VSD		ea		2 000		40,000	42,000
1-100 hp VSD	1	ea		2000		12,000	14,000
Subtotal				6000		112,000	118,000
Salos Tay (4.5%)						5040	5040
FICA/Ins. (20%)	· · · · · ·	•		1200			1200
Subtotal				7200		117,040	124,240
Overhead (15%)							18,636
Profit (10%)							14,288
20nd (19/6)	· · · · · · · · · · · · · · · · · · ·						1572
Harcules Support (60/0)							9524
(ontingency (10%)						_	16826
Construction Cost							1185,086
Sustriction (35)					! 		11,35,000
							
	" '						
lendor quite	Verti	rah	our				
Ď							

						Š
DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 5-4; the proponent agency is OCA.	Y CAPITAL INVESTM	IENT PROGRAMS	1. PROJECT NO.		REQUIREMENT CONTRO DD-M(R) 1661	TORMAS T
2 TO:	3. THRU:		4. FROM:		5. DOD COMP NAME	6. DOD COMP CODE
HU, DA (EACA-RMP)	CDR, AMC (AMC	CRM-MP)	=		Army	A
Rm 3B719 (Pentagon)	β	wer Avenue	Attn: AMSMC- Rock Island.	AMSMC-MGP-P (R) [sland, IL 61299-6000	7. COMMAND CODE W730KK	8. DATE
Mashington, DC 20310-2070	Alexandria,	10. TYPE OF PRCJECT (Check one)		11. AMORTIZATION YEARS/MONTHS	ARS/MONTHS	
Replace Incandescents with 35 W HPS	35 W HPS	ORIF	X OSD PIF		, ,	
SCLEW-1113 (FCO GL-N-1)]		120,001	+ 05,833	×
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	OCCUR	13. ECONOMIC LIFE	14. EXPECTED OPER-	(Project Cou)	(Average Annual Sarbigy	servey (Na Mos)
024				1.9	1	(action of the Common
				(years)	(months)	
16. SUBMITTING UNIT(S)	16, UNIT ID CODE	17. PROJECT DESCRIPTION	NOIL			
dministrative Contracting	WOLLAA	Replace incandescent high pressure sodium	lamps screw-	in explosion-p in lamps.	explosion-proof fixtures with lamps.	with 35 watt
Office Dadford Army Amminition Pt						
Radford, VA 24141						
	·					
18 DETAILED JUSTIFICATION						
High pressure sodium lamps are much more energy efficient than incandescent lamps.	are much more	energy efficie	ent than incande		Replacement in areas where	areas where
color renaltion is not city	בוכמו אוו אמאפ	. 66 . 51				
19. SAVINGS DISPOSITION						
				•		
Savings are used to reduce	reduce energy costs.					
20. OTHER REMARKS (Continue on page 5, 1f more apace is needed)	ore apace is needed)					

ž	314			MMUS	SUMMARY OF DOLLAR SAVINGS	VINGS				•
				(ROUND)	Annual commission there is nelligible the method and source of data for savings	nd source of data for s	wings			
			Attac	PROPOSED METHOD	METHOD			DIFFERENCE/SAVINGS	SAVINGS	
4	SAVINGS	PRESENT	1ST YR	20 VR	3D YR	4TH YR	1ST YR	2D YR	3D VR	ATH YR
ALARY/U	ALARY/LABOR/					,				
MATERIAL!	NAL/	32 968	10.857	10,857	10,857	10,857	22,111	22,111	22,111	22,111
		25,200								
MAINTEN	JTILITIES JAINTENANCE/	11	2 570	3 572	3.572	3,572	8,241	8,241	8,241	8,241
MEPAIN	•	11,613	2,0,0		١,					
	TRANSPORTATION									
LEASE	LEASE COSTS								`	
EALVAGE/	AGE/									- [
ENER	ENERGY (Identity)	49,208	13,799	13,799	13,799	13,799	35,481	35,481	35,481	35,481
8	CONTRACT COSTS								·	
OTHE	OTHER (Identify)									
	TOTALS	94,061	28,228	28,228	28,228	28,228	65,833	65,833	65,833	65,833
					PRIORITIZATION					
<u>. s</u>	INTERNAL RA	INTERNAL RATE OF RETURN (IRR) Diride estimated project cost $\frac{12}{}$	6,001	by average annual savings	65,833	1.91	factor.	72 4168	۵	
	Based on facts	or and number of y	Based on factor and number of years economic life of the	f the project, select	project, select the IRR from Table H-3, App H, Ch. b, AR b-4	. Н-3, Арр Н, Сћ. Б	AR Det		4	
(2)	Maltiply annu	SAVINGS TO INVESTMENT RATIO (8/1) Multiply annual savings 65,833	(a/1) 3 X discount factor	8.78	578,014		and divide by present value of investment	vestment		
	(undiscounted) 126 (Based on economic life	(undiscounted) 126,001 (Besed on economic life 15			S/I. factor from Table H-4, App H, Ch. 6, AR 6-4.	. 6, AR 6-4.				
6	RATE OF INVI	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS)	OWER SPACE (RIMS)	NA				974.0		
	Divide estime	Divide estimated project cost	M	by number of manpowe	ir of manpower space savings	•		KIMB.		
	(Manpower re	quivalents cannot be	(Manpower requivalents cannot be used in this computation.	tetion.)						
_										

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL			
22. EQUIPMENT TYPE	PROPOSED SOURCE OF PROCUREMENT	UNIT PRICE	DUANTITY	TOTAL COST	APPROPRIATION, FY FUNDS BUDGET ACTIVITY REQUIRED OR PROGRAM ELEMENT
•	•	Ü	•		,
w 35 watt HPS lamps		72.41	1,740	126,001	
(3)					
(5)					
(9)					
(y)					
(6) TRANSPORTATION (Equipment delibery)					
(7) EQUIPMENT MODIFICATION			. A		
(8) EQUIPMENT INSTALLATION) 21 1921		
(9) MAINTENANCE CONTRACT ²					
(10) FACILITIES MODIFICATION ³					·
(11) TRAINING					
(12) OTHER (Specify):				126,001	
(13) TOTAL REQUIRED FOR PROJECT TO SECOME OPERATIONAL	DME OPERATIONAL			126,001	
(14) TOTAL AMOUNT OF FL	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			1	
(15) TOTAL AMOUNT OF FL	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			126,001	
(16) TOTAL (8um of (14) + (16) abour)	(16) aboue)				
state of the state	namier v				

I Not to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenence.

³Normally not OPA funded

Used to compute amortisation in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

	The state of the s									
ส่			S !	UMMARY OF SAVI	BUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	AND DOLLARS)				
			SAVINGS				REAPPLICATION OF SAVINGS	SAVINGS		
	TENS	NO. MPR OR MHR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA AND LINE	IND LINE	FUNCTION CODE	N CODE
	•	•	·	9	e. FROM	ر 10	F. FROM	۸. ۲٥	L FROM	. 10
(1)	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
8	REQUIREMENTS ONLY ELIMINATED									
3	BORROWED MILITARY MANPOWER RELEASED									
3	OVERHINES ON TEMPORANIES TERMINATED									
<u> </u>	HOURS OVERTIME ELIMINATED									
ê	MANHOURS SAVED FROM MULTIPLE POSITIONS?			8,241						
3	OTHER DOLLAR SAVINGS (Excluding Merpower), e.g., CONTRACT COSTS & UTILITIES			57,592						
€										
ê										
(01)							·			
(11)	(11) TOTAL DOLLAR SAVINGS		·	65,833			•			·
*	(1) US Graded (2) US Wage Board (3) DHFN (4) IHFN (5) Officer (6) WO	Reflect specific	dutes being pe	rformed with oddition	Reflect specific duties being performed with additional manhours available (equivalent manyears)	ibbe (equivalent man	yeard			

8	1
ăń	1
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91	1
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- 1	- 1
7	- 1
- 24	
- 27	
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REGULATORY APPROVAL/COORDINATION	/AL/COORDINATION
INVESTMENT STATEMENT	BIATEMENT
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning.	facilities. This investment is in accordance with established investment planning. ry constraints.
	•
(Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.)	No.) (Ex. New Start, TAGO Approved, etc.)
A OTHER COORDINATION (Punctional Coordination at local level, e.g., Fac Eng. Log, Pers. etc.)	
26. SUBMITTED BY (Typed name, grade and Bids of Subordinete Command/Agency or Project Initiator)	SIGNATURE DATE (YYMMDD) AUTOVON
28. APPROVAL RECOMMENDED BY (MACOM/Agency)	SIGNATURE DATE (YYMMDD) AUTOVON
77. APPROVED 8 V	FOR USE BY HQDA ON OSD PIF PROJECTS ON LY SIGNATURE AUTOVON
20. OTHER REMARKS (Cont's)	

•	
7	ı
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7	
_	1

REGULATORY APPROVAL/COORDINATION	VAL/COORDINATION	7
INVESTMENT STATEMENT	STATEMENT	
This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints.	facilities. This investment is in accordance with established investment planning. ory constraints.	
	•	
(Cite regulatory approvals, e.g., TAGO Contro	approvels, e.g., TAGO Control No.) (Es. New Start, TAGO Approved, etc.)	
, OTHER COORDINATION (Puneltonal Coordination et local level, e.g., Fac Eng. Log, Pers. etc.)		
5. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project	SIGNATURE DATE (YYMMDD)	
nikeler)	AUTOVOM	
B. APPROVAL RECOMMENDED BY (MACOM/Agency)	SIGNATURE DATE (YYMMDD)	
	AUTOVON	
O NO AUDA ON O	FOR USE BY HODA ON OSD PIF PROJECTS ONLY	
27. APPROVED BY		
	AUTOVON	
30. OTHER REMARKS (Confd)		
	·	

NOLDS. SMITH AND HILL HITECTS • ENGINEERS • PLANNER INCORPORATED	S DESIGNER TOOLS CHECKER	SHEET OF 10 DATE
	INCANDESCENTS WITH 35 PLOSION-PROOF FIXTURES	W HPS SCREW-INS F
	posture [lase] [lase]	
Calculations were	made on a per-unit	basis for installing
	" within the existing a	
•	res. These units consist of	The second secon
	medium tase adapter wh	
incandescent socke	t. the ger-unt colculation	ware on page Z.
From the building	survey dots, a list was a	ompled of the
buildings with both Only areas with his It is assumed that	utial incardescent lighting lating operating 3 shorts fold to 90% of the interior and	50% of the exterior
fixtures (on he retr	of itted in the manner desc	ribed above for this ECC
Total fixtures	= 0.9(1536) + 0.5(7)	(7) = 1740
Energy cost savings = 6	= 0.9(1536) + 0.5(7 74 kwalyr × 0.003413 MBtv/ka 3 = \$20.39 x 1740 fixtures yr-fixture	wh x 1740 tixtures = 4003 H = \$35, 479/yr
Labor d mot l cost sav	yr-fixture x 1740 =	\$ 39 346/yr
Total cost surings	= \$35479 f \$36346 =	\$65,825/yr
Project cost = \$	80.46 , 1740 fixtures = fixture ost = 4149,000/1.115 =	\$140,000
(Construction c	ost = \$140,000 /1.115 =	*125, 561)
	\$ 140,000 = 2.1 yr \$ 65,8251/yr	

EYNOLDS. SMITH AND HILLS RCHITECTS · ENGINEERS · PLANNERS INCORPORATED CHECKER SUBJECT RAAP Light SC rClining Call Call Call Checker CHECKER	AEP NO 290 0349 000 SHEET Z OF 10 DATE DATE
GP-N-1 Replace intlest 150-200W inconscrew-in retrofits for explosion.	proof applications *
Energy Savings = (150 W-42W) x	
Energy Cost Savings = 674 kmh 10.	
Labor & Mat'l Cost Savings = / Includ, Cost 150 hr	TRUCK NY
$= ($2,11 \text{ mod} + $1.20 \text{ lobor} \times $0.683 \times 1.2 \text{ ap} - 750 hr $\times \frac{6240 \text{ hr}}{y} = 17.44	16,000 hr
Total lost savings = \$20.39 + yr Md'l cost = \$45 for fixture w/ lam	= \$37.83 yv (1990 Heador into.)
Labor cost = \$1.20 × 1.20 × 1.20 exp-y	
Project Cost = [(1.045 x \$45) + Simple payback = \$80.46 = \$37.83/yr	= (1.2 x \$1.18) x1.661 = \$80.46 = 2.1 yr < 10 yr
Note: HPS lamps are replaceable in	the reprofit pallasts.

RSH	•
	0

SUBJECT	AEP NO
	SHEETOF
DESIGNER	DATE
CHECKER	DATE

QRIP Calcis

Current energy use for 1740 lamps: 150 W × 24 × 260 × 0.03026 × 1740 = \$\frac{49,280/yr}{1000}\$

Current matil i labor costs:

 $\frac{2.11 + 1.2 \times 0.68 \times 12 \times 62 \times 1740}{750} = # 44,731/yr$

Current Rebor costs

1.2 × 0.68 × 6240 × 1740 = \$11,813/y-

New Energy use

42W x 2d x 260 x 0,03026 x 1740 = \$ 13,799/Jr

New mad'l & labor costs:

16 + 6.45 x 0.68 x 1.2 x 6240 x 1740 = \$14,429/gr

New Labor costs

6.45 × 0.68 × 1.2 × 6240 × 1740 = #3572/y.

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green. C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
7106 -04	Dry House #4 (Cure Grain)	1st R P	7	8	56
9334 -15	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
	Boiling Tub House		3	50	150
2022 -00	Beater House	NC. B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3 3	30	90
	C-1 Press & Cutting House		3	50	150
4912 -40	Forced Air Dry House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
4912 -03	MK 43 Sawing and Inhibiting	Cast Prop. (Rocket)	1	4	4
4915 -00	Small Grain Mold Assembly	Cast Prop. (Rocket)	1	7	7
4921 -00	Inspect/Clean NG Tanks *	Cast Prop. (Rocket)	1	21	21
4951 -02	TOW Launch Saw House	Pilot B	1	8	8
5008 -01	15 Inch Press House	Pilot A	3	2	6
	Paste Blending House		1	20	20
7113 -00	Roll House (Rolled Powder)	1st R P (F-Line)	1	130	130
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST ESTIMATE				DATE PREPARED 6-9	0		SHEET	4 or 10
ROJECT ENERGY ENGINEERING	ANALYS	IS	-		BASIS FOR ESTIMATE CODE A (No design completed)			
RADFORD ARMY AMMUN	ITION F	LANT			CODE & (Preliminary design)			
REYNOLDS, SMITH AND HILLS A.E.P., INC.						CODE C		(m)
DRAWING NO. ESTIMATOR					!	CHECKE	D BY	
GP-N-1	QUANT	ITY	7. 1	LABOR	[MATERIA	_	
Incaud to 35 WHESUMMARY	NO. UNITS	UNIT MEAS.		TOTAL	PER		TAL	TOTAL COST
Replace incondescent	1740	fivt.	1.18	2053	45.00	7	8300	80 353
lamps with 35 w HPS								
scrow-in retrofits			-					
Sales Tax	4.5%						3524	3524
FICA/ Fusurance	20,0%			411				411
Subtotal	<u> </u>			2464		8	1824	84288
Overhead	15.0%			<u> </u>				12643
Profit	10.0%	-						9693
Performance Bond	1.0%							1066
Heraites Support Contingency	62%			ļ				6461
	10.0%			ļ				11415
Construction Cost					ļ			125566
						· .		
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GPN-1 p. 5 of 10

ECP ENERGY CONSERVATION PRODUCTS, 511 CANAL STREET, NYC, NY, 10013—TEL (212)-925-5991

POWER CONSUMPTION AND LUMEN CUTPUT DATA

	*****	:==:==================================			
*		TOTAL	LUMENS	HOURS OF	*
* WATTS	LINE WATTS	LUMEN CUTPUT	PER WATT	RATED LIFE	*
***** MERCUR	Y VAPOR (DELUXI	E WHITE)			*
* 1000	1075	63000	59	24000	*
* 400	450	23000	56	24000	*
* 250	290	13000	42	24000	*
* 175	205	8500	49	24000	
* 100	120	4500	42	24000	
* 75	93	3150	37 31	16000 16000	*
* 50	61 	1680 			
****** METAL	HALIDE				*
* 1500	1600	155000	103	3000	#
* 1000	1100	110000	100	12000	
* 400	460	34000	85 25	15000	π ±
* 175	210	14000	85 	7500	
****** HIGH I	RESSURE SODIUM				*
* 1000	1080	140000	130	24000	*
* 400	480	50000	104	24000	
* 250	310	27500	89	24000	*
* 150	200	16000	80	24000	*
100	135	9500		24000 24000	* * * *
70	70	5800 400 0	57	24000 24000	*
* (50) * (35)	(42)	2850	67	18000	*

*******FWORES	CENT				*
STRAIGHT 40	48	3150	66	20000+	*
CIRCLINE 32	3 7	1830	50	12000+	*
CIRCLINE 22	25	1050	42	12000+ 12000+	*
TWIN TUBE 13	23 — 16	850 900	37 56	10000+	*
TWIN TUBE 13 TWIN TUBE 9	12	60 0	50	10000+	*
STRAIGHT 8	··· ·-·· 11	400	3 6	7500+	*
TWIN TUBE 7	10	400	40	10000+	*
STRAIGHT 6	9	300	33	7500 +	*
TWIN TUBE 5	8	250	31	10000+	***
****** INCAN	DESCENT	:			*
1000	1000	23740	24	1000	*
* 750	750	17040	23	1000	
* 500	500	10850	22	1000	☆
* 200	200	3710	19	750	π
* (150)	150	2880	19	<u> </u>	*
* 100 * 75	100 75	1750 1190	18 16	750 750	_ · · #-
		19222232222 1120		, 30 	
	S-IODINF.			2000	*
* 1500	1530	35800	24	3000	*
* 1000 * 500	10 00 50 0	23 400 1095 0	23 22	20 00 26 00	*
* 250	250	4850		2000	
4JV		7077	 	2000	

LAMP	WATTAGE	APPX LUMENS	AVERAGE LIFE HRS.	STANDARD CASE QTY.



RAPID START FLUORESCENT U LAMPS

FB40/U6/CW/EW	34	2,600	12,000	12	
FB40/U6/CW	40	2,9 5 0	12,000	12	
, , , , , , , , , , , , , , , , , , , ,					



INSTANT START SLIMLINE FLUORESCENT LAMPS

F7ZT12/CW	55	4,550	12,000	12
F96T12/CW/EW	60	5,600	15,000	15
F96T12/CW	75	6,200	12,000	15



HIGH & VERY HIGH OUTPUT FLUORESCENT LAMPS

F96T12/CW/HO/EW F96T12/CW/HO F96T12/CW/VHO/EW	110 185	8,300 9,200 14,000	12,000 12,000 12,000	15 15 15
F96T12/CW/VHO	215	15,500	12,000	15



METAL HALIDE UNIVERSAL BURN MEDIUM BASE LAMPS

MH35/U	35	2,300	5,000	12
MH50/U	50	3.400	5,000	12
MH70/U	70	5.500	5,000	12
MH100/U	100	7,200	7,500	12
MH150/U	150	12,000	10,000	12



METAL HALIDE UNIVERSAL BURN MOGAL BASE LAMPS

IF IVE INCHES				
MH175/U	175	14,000	10,000	12
MH175/C/U	175	14,000	10,000	12
MH250/U	250	20,500	10.000	12
MH250/C/U	250	20.500	10,000	12
MH400/U	400	36.000	20,000	6
MH400/C/U	400	36,000	20,000	6
MH1000/U	1000	110,000	12,000	6
MH1000/C/U	1000	105,000	12,000	6



COMPACT DOUBLE ENDED HO! METAL HALIDE LAMPS

HQ1 70	70	5,000	10.000	12
HQI 150	150	11,000	10,000	12
HQI 250	250	19,000	10,000	12
HQI 400	400	25.000	10.000	12



HIGH PRESSURE SODIUM MEDIUM BASE LAMPS

LU35/MED	35	2.250	16,000	12
LU35/D/MED	35	2,150	16.000	12
LU50/MED	50	4.000	24,000	12
LU50/D/MED	50	3.800	24.000	12
LU70/MED	70	6,300	24,000	12
LU70/D/MED	70	5.985	24,000	12
LU100/MED	100	9,500	24.000	12
LU100/D/MED	100	8.800	24,000	12
LU150/MED	150	16,000	24.000	12
LU150/D/MED	150	15.000	24,000	12



COLOR IMPROVED HIGH PRESSURE SOUTH LAMP

COMPUTATIONE	o man i m		D	
NHT50SDX	50	2,500	12.000	12



HIGH PRESSURE SODIUM ED-231/2 MOGUL BASE LAMPS

LU 50	50	4,000	24,000	12
LU50/D	50	3,800	24.000	12
LU70	70	6.300	24.000	12
LU70/D	70	5.9 85	24,000	12
LU100	100	9.500	24,000	12
LU100/D	100	8.800	24.000	12
LU150/55	150	16,000	24.000	12
LU150/55/D	150	15.000	24.000	12



LAMP	WAI DAGE	LUMENS	LIFE HRS.	CASE OTY.
HIGH PRESSU	RE SODIUM	E-18 MOGU	L BASE LA	MP8
LU200	200	22.000	24.000	12
LU250	250	29,000	24,000	12
LU250/D	250	26,000	24,000	12
LU310	310	37,000	24,000	12
LU400	400	50,000	24,000	12



LOW PRESSURE SODIUM LAMPS

S0X10	10	1,000	9,000 14,000	20
SOX18 SOX35 SOX55	35 55	4.800 8.000	18,000 18,000	12
S0X90	90 135	13,500 22,500	18,000 18,000	9
SOX135 SOX180	180	33,000	18.000	9



MR16 I DW VOITAGE 12V TUNGSTEN HALDGEN LAMPS

WH IS TOM ANY	TWOS ISA II	Disgoi Fig 11	VERAFIL EL	uiii •
ESX (N)	20	3.300	2,000	20
BAB (W)	20	460	2.000	20
EYR (N)	42	7.300	2,000	20
EYS (M)	42	2.500	2,000	20
EYP (W)	42	1,200	2,000	20
EXT (N)	50	9,150	3,000	20
EXZ (M)	50	3,000	3,000	20
EXN (W)	50	1,500	3,000	20
EYF (N)	75	11.500	3,500	20
EYJ (M)	75	4,500	3.500	20
FYC (W)	75	2.000	3,500	20



MR16 LINE VOLTAGE 120V MEDIUM BASE

IUNGSIEN NALU	GEN LAM	ro		
M/JDR75W/N	75	6,300	2.000	12
M/JDR75W/M	75	3,500	2.000	12
M/JDR75W/W	75	2,100	2,000	12
M/JDR100/N	100	8,500	2.000	12
M/JDR100/M	100	4,500	2.000	12
M/JDR100/W	100	3,000	2.000	12



MR16 LINE VOLTAGE 120V INTERMEDIATE BASE

I/JDR75W/N	. 75	6.300	2.000	12
1/JDR75W/M	75	3,500	2.000	12
I/JDR75W/W	75	2,100	2.000	12
I/JDR100/N	100	8.500	2.000	12
I/JDR100/M	100	4.500	2.000	12
/JDR100/W	100	3,000	2.000	12



TUNGSTEN HALOGEN LINE VOLTAGE MEDIUM BASE

TUBULAR LAM	PS			
64484/CL	75	1,200	2,000	15
64484/FR	75	1,140 1,600	2.000 2.000	15 15
64486/CL 64486/FR	100	1.520	2.000	15
64488/CL	150	2.760	2.000	15
6AARR/ED	150	2 622	2.000	15



TUNGSTEN HALOGEN LINE VOLTAGE

DOODLE EUDED	CVINIT O			
0100T3/CL 0150T3/CL 0200T3/CL 0300T3/CL 0500T3/CL 01500T3/CL	100 150 200 300 500 1500	1.600 2.800 3.600 6.000 11,000 33.000	200 200 200 200 200 200 200	12 12 12 12 12 12 12



TEL. (800) 552-3465 · (718) 851-4577 · FAX (718) 853-2390 AMERICAN SCIENTIFIC LIGHTING CORPORATION BROOKLYN, NEW YORK

	,	П	T	DAILY	MAN-			BARE	COSTS		TOTAL	
9 16	66 100 Lighting	CRE	EW	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OEP	
140 1600 1	90 watt	1 E	lec	.30	26.670	С	5,140	645		5,785	6,600	140
1650	135 wait			20	40		6,905	970		7,875	9,025	
1700	180 watt		\dashv	.20	40		7,308	970		8,278	9,475	l
	Quartz line, clear, 500 watt			1.10	7.270		1,872	175		2,047	2,325	
1750 1760	1500 watt		-	.20	40		3,427	970		4,397	5,200	l
4	Incandescent, interior, A21, 100 watt			1.60	5		173	120		293	370	
1800	A21, 150 watt	1	\dashv	1.60	5		(211)	(20)		331	410	
1900	A21, 130 watt			1.60	5		227	120		347	430	
2000		1-	_	1.60	5		330	120		450	540	ĺ
2200	PS 30, 300 watt	1		1.60	5		576	120		696	810	
2210	PS 35, 500 watt(\blacksquare	ᆉ				1,525	150		1,675	1,900	ł
2230	PS 52, 1000 watt	1		1.30	6.150		1 1	150		2.532	2.850	
2240	PS 52, 1500 watt	╂┷┥	\dashv	1.30	6.150		2,382			525	630	ł
2300	R30, 75 watt	1		1.30	6.150		375	150			670	
2400	R40, 150 watt	lacksquare	_	1.30	6.150	-	408	150		558	****	ł
2500	Extenior, PAR 38, 75 watt			1.30	6.150		566	150		716	840	
2600	PAR 38, 150 watt	\square	_	1.30	6.150	<u> </u>	525	150		675	795	ł
2700	PAR 46, 200 watt	1 1		1.10	7.270		1,928	175		2,103	2,375	1
2800	PAR 56, 300 watt	\downarrow		1.10	7.270		2,193	175		2,368	2,675	ł
3000	Guards, fluorescent immp, 4' long			1	8		375	195		570	695	1
3200	8' long			90	8.890	<u> </u>	535	215		750	905	
145 0010	RESIDENTIAL FIXTURES											145
0400	Fluorescent, interior, surface, circline, 32 watt & 40 watt	1 E	iec	20	.400	Ea.	48	9.70		57.70	67	ļ
0500	2' x 2', two U 40 watt			8	1		66	24		90	110	1
0700	Shallow under cabinet, two 20 watt			16	.500	.	45	12.15		57.15	67	1
000	Wall mounted, 41., one 40 watt, with baffle	T		10	.800		41	19.40		60.40	74	1
12000	Incandescent, exterior lantern, wall mounted, 60 watt			16	.500		36	12.15		48.15	57	1
2100	Post light, 150W, with 7' post	1		4	2		104	49		153	185	1
2500	Lamp holder, weatherproof with 150W PAR			16	.500		16	12.15	ł	28.15	35	1
	With reflector and guard	+-		12	.667		31	16.15		47.15	58	1
2550	Interior pendent, globe with shade, 150 watt	1.		20	400	ll	78	9.70		87.70	100	1
2600		+		20			- 1	0.70				150
150 0010	TRACK LIGHTING	١.,	The .	6.70	1.190	Ea.	33	29		62	79	
0080	Track, 1 circuit, 4' section	+'-	Elec	5.30	1.510		48	37		85	105	1
0100	8' section		1		1		81	44		125	155	
0200	12 99CHOH	+	-	4.40	1.820	╌				65	82	1
0300	3 circuits, 4' section	1		6.70	1.190		36	29		85	105	1
0400	8' section	+	-	5.30	1.510	╀	48	37		132	160	1
0500	8' section 12' section Feed kit, surface mounting		İ	4.40	1.820	1	88	44		24.15		ı
1000	Feed kit, surface mounting	4_	_	16	.500		12	12.15	 			:1
1100	End cover			24	.333	1	1.98	8.10	1	10.08	l	Ί
1200	Feed kit, stem mounting, 1 circuit	ᆚ_	Ļ	16	.500	1—	16	12.15		28.15		-
1300	3 circuit	1		16	.500		16	12.15		28.15		
2000	Electrical joiner for continuous runs, 1 circuit			32	.250		6.55			12.60		4
2100	3 circuit			32	.250		12.10	ı	1	18.15		1
2200	Fixtures, spottight, 150 PAR	$oldsymbol{\perp}$		16	.500		47	12.15	<u> </u>	59.15		4
3000	Wall washer, 250 watt tungsten halogen			16	.500		101	12.15		113.15	1	
3100	Low voltage, 25 watt, 1 circuit			16	.500		102	12.15	<u> </u>	114.15		4
	3 circuit	1		16	.500		109	12.15	il	121.15	140	
3120		-1	•	1	1	1	1	1	1	1	1	1

	6 6	Lighting												District
-		6 100 Lighting			DAILY	MAN-					COSTS	79741	TOTAL	
	76	6 100 Lighting	_	EW	OUTPUT			NIT	MAT.	LABOR	EQUIP.	TOTAL	INCL OAP	135
	5100	175 watt metal halide	11	lec	8	1	E	a .	479	24 24		503 524	565 585	133
	5110	250 watt metal halide	┡		8		_	\vdash	500 535	24		559	625	1
	5120	150 watt high pressure sodium			8	1			556	24		580	645	1
	5130	250 watt high pressure sodium	┞	\vdash	8			\vdash	525	24		549	615	İ
	5140	72"H 18" sq., 400 watt metal halide	ł		8 8	;			556	24		580	645	:
	5150	250 watt high pressure sodium 400 watt high pressure sodium	⊢		8	1	_		581	24		605	675	1
	5160	Portable rectangle, 6" high 13.5" x 20"		¥ :	J	'		٠		-				
	5190	175 watt metal halide	11	Elec	12	.667	E	2.	293	16.15		309.15	345	I
	5200 5210	250 watt metal halide	``		12	.667			314	16.15		330.15	370	
	5220	150 watt high pressure sodium			12	.667			335	16.15		351.15	390	
	5230	250 watt high pressure sodium			12	.667			360	16.15		376.15		
	5240	8" high 18" x 24", 400 watt metal halide			12	.667			365	16.15		381.15		
	5250	250 watt high pressure sodium			12	.667			376	16.15		392.15		Į
	5260	400 watt high pressure sodium			12	.667		1	398	16.15		414.15		•
	5270	Portable equere, 15" high 13.5" sq., 175 watt metal halide	L		12	.667	_	-	324	16.15		340.15		ł
	5280	250 watt metal halide		Ì	12	.667			376	16.15	ŀ	392.15	1	
	5290	150 watt high pressure sodium	<u> </u>	ļ	12	.667	_	┼-	360	16.15		376.15 402.15		1
	5300	250 watt high pressure sodium			12	.667			386	16.15 61		416	480	
	5400	Pendent 16" round/square, 175 watt metal halide	┞	┼	3.20	2.500	-	╁	355 370	72		442	515	1
	5410	250 watt metal halide		İ	2.70	2.960 3.330			398	81		479	555	
	5420	400 watt metal halide	1	╁	3.20	2.500	┢	╁╴	398	61		459	525	1
	5430	150 watt high pressure sodium 250 watt high pressure sodium			2.70	2.960			428	72		500	575	1
4	5440	400 watt high pressure sodium	╁	${f +}$	2.40	3.330	Н	<u> </u>	454	81		535	620	1
1	9 0	400 Watt light pressure southin	1	•		0.550		•					<u> </u>	<u> </u>
140	0010	LAMP8	T				Т							140
140	0080	Fluorescent, rapid start, cool white, 2' long, 20 watt	1	Elec	1	8		C	348	195	<u> </u>	543	670	1
	0100	4' long, 40 watt	T	T	.90	8.890			198	215		413	535	•
	0120	3' long, 30 watt			.90	8.890	L		442	215		657	805	4
	0150	U-40 watt			.80	10			874	245		1,119	1,325	
	0170	4' long, 35 watt energy saver	L		.90	8.890	L	\downarrow	270	215		485	615	-
	0200	Slimline, 4' long, 40 watt	1		.90	8.890	١		618	215		833	995 990	
	0300	8' long, 75 watt	┸	_	.80	10	1	+	577	245	 	822	1,025	┪
	0350	8' long, 60 watt energy saver			.80	10	1		603	245		965	1,150	1
	0400	High output, 4' long, 60 watt	 	+-	.90	8.890	┞	+	750 77 5	215 2 45	 	1,020	1,200	1
	0500	8' long, 110 watt	1		.80	10 8.890	ı		1,285	215		1,500	1,725	1
	0520	Very high output, 4' long, 110 watt	╀	+	.90	11.430	╁	+	1,285	275	 	1,560	1.825	1
	0550	8' long, 215 watt	ı		.30	26.670		1	2.142	645		2,787	3,300	i
	0600	Mercury vapor, mogul base, deluxe white, 100 watt	╁╌	+	.30	26.670	-	╁	1,663	645	1	2,308	2,775	7
	0650	175 watt 250 watt	ı		.30	26.670			2,968	645		3,613	4,225	
	0700	400 watt	╁	╁╴	.30	26.670		+	2,340	645		2,985	3,525	1
	0800	1000 watt	ı		.20	40	l		5,100	970		6,070	7,025	_
	1000	Metal halide, mogul base, 175 watt	1	\top	.30	26.670	Τ		3,749	645		4,394	5,075	1
	1100	250 watt			.30	26.670			4,712	645		5,357	6,125	4
	1200	400 watt	T		.30	26.670	T		4,386	645		5,031	5,775	
	1300	1000 watt			.20	40			9,894	970		10.864	12,300	4
	1320	1000 watt, 125,000 initial lumens	Ī		.20	40			9,960	970		10,930	12,400	
	1330	1500 watt	\perp	\perp	.20	40	1	4	9.268	970	-	10,238	11,600 6,125	-1
4	250	Sodium high pressure, 70 watt			.30	26.670	1		4,712	645		5,357	6,300	
	560	100 watt	1	\perp	.30	26.670	-	-	4,871	645	+	5,516 5,704	6,525	+
	1370	150 watt			.30	26.670			5,059	645		6,025	6,875	1
	1380	250 watt	+	+	.30	26.670	_	+	5,380	645	-	6.372	7,250	7
	1400	400 watt			.30	26.670	1		5,727	970		14,322	16,100	1
	1450	1000 watt	+	+	.20	26,670	+	+	13,352 3,963	645	+	4,608	5,300	7
	1500	Low pressure, 35 watt			.30	26.670			4,386	645		5,031	5,775	
	1550	55 watt			1 .30	20.07	1		1 -1,000		<u> </u>			9

Hunter

Distribution:

(7P-N-1 7.9 of 10
Telephone Call Confirmation:

	Project No. 290 0379 000
	(248)
4	T. Todd. Conversed With Mr. Singer environ Scientific Lighting Co. Regarding HPS retrotits
Of TIM	Regarding 711) reported
<u></u>	ab l'il fine l'an + Cichies + Pa "R M 1" a id+"
for	"Colorlight" products are recommended. The lamps one ceable in both and the "colorlight" is more whitish, vactors costs (including lamp) for quantities of 100+ as follows:
_ma	"Colorlight products are recommended. The lamps we
- réph	ceable in both and the colorlight is more white.
Obre	vactors costs (including lamp) for quantities of 100+
ar	as follows:
	Bulb Lumenight 35 W - \$45 (lamps only)
	50 W - \$45 (\$16-\$20)
	(also come in 70 W 100 W 150 W)
	Bulb Lumenight 35 W - \$45 (lamps only) 50 W - \$45 (\$16-\$20) (also come in 70 W, 100 W 150 W) Colorlight 50 W - \$67 (lamps only)
	Colorlight 50W - \$67 (lamps only \$30)
	<pre></pre>
-tho.	will send a copy of their rotalog for dimensions.
r	
<u>,</u>	



FLUOR-A-LAMPTM SERIES: COMPACT FLUORESCENT LAMPS

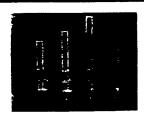


GLOBE LAMP/LUMA LAMP

- LAMP: Compact disposable fluorescent globe or tubular lamp/standard or tapered base
- WATTAGE: Fifteen
- LUMENS: 720
- COLOR: Warm white/2800k
- . USE: Indoor only
- . BURNING POSITION: Any
- LAMP LIFÈ: 9,000 hours
- . INSTALLATION: Screws into any 120V medium base socket
- . PACKAGING: Ten lamps per master carton

CATALOG NUMBER	LAMP	DIMENSIONS
FGL S/15	BFG15 LE/A	Lamp Diameter 3¾"
		Overall Length 61/4"
FGL T/15	BFG15 LE/T	Lamp Diameter 3%
		Overall Length 634"
FLL S/15	BFT15 LE/A	Lamp Diameter 31/6
		Overall Length 6%"
FLL T/15	BFT15 LE/T	Lamp Diameter 31/6
		Overall Length 7"

CONVERT-A-LITETM SERIES: SCREW-IN FLUORESCENT ADAPTER CONVERSIONS





ECONOMY CUP CONVERSION

- ADAPTER: Molded Norel® thermal plastic/Sealed and potted to protect internal components
- FINISH: White
- . LAMP: Centered on top of adapter/Not dimmable
- INSTALLATION: Adapter screws into any standard 120v medium based socket/No additional wiring or modified circuitry required
- · PACKAGING: Bulk packed/Lamp included

PREMIUM CUP CONVERSION

- ADAPTER: Molded Norel* thermal plastic/Sealed to protect internal components
- · FINISH: Black
- LAMP: Centered/Recessed inside of adapter/Not dimmable
- INSTALLATION: Adapter screws into any standard 120v medium base socket/No additional wiring or modified circuitry required/Ratched screw base prevents over
- . PACKAGING: Bulk packed/Lamp included

CATALOG NUMBER	LAMP	DIMENSIONS
		Adapter Diameter 21/4"
CC/5/E	PL5	Overall Length 63/4"
CC/7/E	PL7	Overali Length 71/2"
CC/9/E	PL9	Overall Length 8%"
CC/13/E	PL13	Overall Length 91%6"
CC/Q9/E	Quad 9	Overall Length 65%"
CC/Q13/E	Quad 13	Overall Length 7"
CATALOG NUMBER	LAMP	DIMENSIONS
	LAMP	DIMENSIONS Adapter Diameter 234"
	LAMP PL5	
NUMBER		Adapter Diameter 2¾"
CC/5/P	PL5	Adapter Diameter 2¾" Overall Length 5½"
CC/5/P CC/7/P	PL5 PL7	Adapter Diameter 2¾" Overall Length 5½" Overall Length 6¾."
CC/5/P CC/7/P CC/9/P	PL5 PL7 PL9	Adapter Diameter 2¾" Overall Length 5½" Overall Length 6¾," Overall Length 8"
CC/5/P CC/7/P CC/9/P CC/13/P	PL5 PL7 PL9 PL13	Adapter Diameter 23/4" Overall Length 51/2" Overall Length 61%,6" Overall Length 8" Overall Length 81%,6"
CC/5/P CC/7/P CC/9/P CC/13/P CC/Q9/P	PL5 PL7 PL9 PL13 QUAD 9	Adapter Olameter 23/4" Overall Length 51/2" Overall Length 61%,6" Overall Length 81%,6" Overall Length 51/4"

Overall Length 9%.

SWS Direct Wire-Side

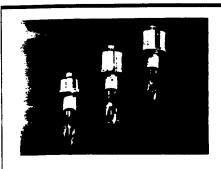
DWC Direct Wire-Center

QUAD 28

CC/Q28/P

PREMIUM OPTIONS:

CONVERT-A-LITETM SERIES: SCREW-IN HPS ADAPTER CONVERSIONS



BULB LUMENIGHT™

- ADAPTER: Heavy gauge spun aluminum
- FINISH: Caustic etching
- INSTALL ATION: Adapter screws into a standard 120V medium base porcelin socket/No additional wiring or modified circuitry required/Safety weight ground wire
- . PACKAGING: Four per carton/Lamp included

CATALOG NUMBER	LAMP	DIMENSIONS
BL/35 BL/50	LU35 LU50	Diameter 31/2" Overall Length 93/6"
B L/70	LU70	Diameter 31/4" Overall Length 10 1/16"
BL/100 BL/150	LU100 LU150	Diameter 4" Overall Length 101/4"
	Bay Reflector	DW Direct Wire

AMERICAN SCIENTIFIC LIGHTING CORPORATION

BROOKLYN. NEW YORK

TEL. (800) 522-3465

(718) 851-4577

·FAX (718) 853-2390

DOCUMENTATION FOR PRODUCTIVITY CAPITAL INVESTMENT PROGRAMS For use of this form, see AR 8-4; the proponent agency is OCA.	Y CAPITAL INVESTM: the proponent agency is 0		1. PROJECT NO.		RRQUIREMENT CONTROL SYMBOL DD-M(R) 1561	
	AMC (AMCRM_MD)	4. FROM: CDR AMCCOM		6. DOD COMP NAME Army	6. DOD COMP CODE
Mg 38719 (Pentagon)	nhow w	Eisenhower Avenue	Attn: AMSMC-M	AMSMC-MGP-P (R)	7. COMMAND CODE W730KK	8. DATE
9. PROJECT TITLE		10. TYPE OF PRCJECT (Check one)	1	11. AMORTIZATION YEARS/MONTHS	ARS/MONTHS	
Change Incinerator Fuel to Natural Gas (ECO GP-X-6)		OBIN OF THE O	X 080 PIF T PECIP	• 250,875	+ 78 457	× 12
12. FUNCTIONAL AREA WHERE SAVINGS WILL OCCUR	. occur	13. ECONOMIC LIFE	14. EXPECTED OPER- ATIONAL DATE	(Profect Cou)	(Average Annual Savbres)	
- 1 2				3.2 or (years)	(months) (emortization)	rization)
16. SUBMITTING UNIT(S)	16. UNIT ID CODE		NO!			1
Administrative Contracting Office Radford Army Ammunition Pt Radford, VA 24141	WOLLAA	Install a na replace #2 f	a natural gas line to the waste #2 fuel oil as combustion fuel.		propellant incinerators	nerators to
					•	
18. DETAILED JUSTIFICATION						
Currently #2 fuel oil is used existing natural gas line to Btu basis.	sed to incinera to the inciner	to incinerate the waste p the incinerator is more e	is used to incinerate the waste propellant generated at Radford AAP. Extending the line to the incinerator is more economic due to the lower cost of natural gas on a	rated at Radfor the lower cost	d AAP. Extend of natural ga	ing the s on a
19. SAVINGS DISPOSITION						
Cost savings will reduce utility bills	tility bills.			:		
20, OTHER REMARKS (Continue on page 5, 1f mo	page 5, if more apace is needed)					

i i				SUMMA (ROUND OF)	SUMMARY OF DOLLAR SAVINGS (ROUND OFF TO THE NEAREST DOLLAR)	INGS VOLLAR)				•
				to the state of the	serion sheet identifying the method and source of data for savings	t source of data for sal	ings			
	-		Allecu com	PROPOSED METHOD	AETHOD			DIFFERENCE/SAVINGS	SAVINGS	
- 5	SAVINGS	PRESENT	1ST YR	20 VR	3D Y.R.	4TH YR	18T VA	20 YR	30 VR	ATH VR
BALARY/L	ALARY/LABOR/ WENTIME					•				
BUPPLIES	ATERIAL/ UPPLIES									
STILITIES	TIES									
MAINTE	MAINTENANCE/ NEPAIR									
1	FRAMEPORTATION									
3	LEASE COSTS								,	
SALVAG TURN-IN	SALVAGE/ TURN-IN								·	1
ENENGY Fue	ENERGY (Identity) Fuel Oil	368,146	289,689	289,689	289,689	289,689	78,457	78,457	78,457	78,457
8	CONTRACT COSTS									
5	OTHER (Identify)									
	TOTALS	368,146	289,689	289,689	289,689	289,689	78,457	78,457	78,457	78,457
١,					PRIORITIZATION					
. s_	INTERNAL RAT	INTERNAL RATE OF RETURN (IRR) Divide estimated project cost 250,875	1 1	by average annual savings	78,457	3.2		37 C. 188	œ	
	Based on factor	r and number of year	Based on factor and number of years economic life of the	the project, select (project, select the IRR from Table H-3, App H, Ch. b, AR b-4	H-3, App H, Ch. 5,				
13	SAVINGS TO IN	Maltiply annual sertings 78,457	vi) X diacount factor	1 1	1,205,227	7 and divide by present value of investment	sent value of inv	setment		
	(undiscounted) 250 (Based on economic life	250,875 comic life 25			8/l. . factor from Table H-4, App H, Ch. 5, AR 5-4	6, AR 6-4.				
8	1	RATE OF INVESTMENT PER MANPOWER SPACE (RIMS) Divide setimated project cost by	WER SPACE (RINS)	NA NA by number of manpower space savings	r space savings			RIMB.		
	(Manpower req	quivalents cannot be	(Manpower requivalents cannot be used in this computation	ıtlon.)						

	COST FOR PROJECT TO BECOME OPERATIONAL	COME OPERATIONAL			
n	TANABLI COS TO TO TO TO TO TO TO TO TO TO TO TO TO		QUANTITY	TOTAL COST	APPROPRIATION, FY FUNDS BUDGET ACTIVITY REQUIRED
EDUIPMENT TYPE	PROPOSED GOUNCE OF PROCONEMEN				=
w Natural Gas Line		250,875		250,875	
(2)					
(6)					
(4)					
(9)					
(6) TRANSPORTATION (Equipment delibery)					
(7) EQUIPMENT MODIFICATION					
(8) EQUIPMENT INSTALLATION			nig Vini Ji sahin		
(9) MAINTENANCE CONTRACT ³					
(10) FACILITIES MODIFICATION ³					
(11) TRAINING					
(12) OTHER (Specify):					
(13) TOTAL REQUIRED FOR PROJECT TO BECOME OPERATIONAL	OME OPERATIONAL			250,875	
(14) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUESTED IN THIS PROPOSAL			250,875	
(16) TOTAL AMOUNT OF F	TOTAL AMOUNT OF FUNDING REQUIRED FROM OTHER SOURCE			1	1/4**
(16) TOTAL (8um of (14) + (15) above)	(18) above)			250,875	

INot to exceed 10% of equipment cost for QRIP projects.

Applicable to OPA QRIP provided cost is included in packaged deal involving one bill for the equipment and initial maintenance.

³ Normally not OPA funded

Used to compute amortication in Item 11.

Specify source to include certification that funds are available, if financed from the regular budget:

C 1, AR 5-4

4	Toer isnamu									
ជ			Ö	SUMMARY OF SAVINGS (MANPOWER AND DOLLARS)	NGS (MANPOWER	AND DOLLARS)				
			SAVINGS				REAFFLICATION OF SAVINGS	SAVINGS		
	ITEM	NO. MPR OR MHR	TYPE	DOLLARS	PROGRAM ELEMENT	ELEMENT	TOA PARA AND LINE	IND LINE	FUNCTION CODE	CODE
		•	v	70	e. FROM	ر 10	F. FROM	, TO	L FROM L	TO
\hat{z}	REQUIREMENTS AND AUTHORIZATIONS ELIMINATED									
8	REQUIREMENTS ONLY ELIMINATED									
9	BORROWED MILITARY MANPOWER RELEASED						45			
ર	OVERHIRES OR TEMPORARIES TERMINATED									
9	HOURS OVERTIME ELIMINATED									
£	MANHOURS SAVED FROM MULTIPLE POSITIONS									
3	OTHER DOLLAR SAVINGS (Excluding Merpower), e.g., CONTRACT COSTS & UTILITIES			74,457						
9										
ê										
(01)										
an	(11) TOTAL BOLLAR SAVINGS			74,457						
0	(1) US Graded (2) US Wage Board (3) DMFN (4) 1HFN (5) Officer (6) WO (7) Entired	Reflect specific dutter being p	dutes being po	erformed with additional manhours available (equivalent manyears)	wal manhours availa	bk (equivaknı man,	kisa			

DATE (YYMNDD) DATE (YYMMDD) DATE (YYMMDD) This proposal has been reviewed and it cannot be implemented with existing equipment or facilities. This investment is in accordance with established investment planning. The project complies with public laws, OSD policies and regulations, and all other regulatory constraints. AUTOVON AUTOVON AUTOVON (Cite regulatory approvals, e.g., TAGO Control No.) (Ex. New Start, TAGO Approval, etc.) POR USE BY HQDA ON OSD PIF PROJECTS ONLY
SIGNATURE REGULATORY APPROVAL/COORDINATION INVESTMENT STATEMENT SIGNATURE SIGNATURE A OTHER COORDINATION (Punelland Coordination at local lawi, e.g., Fec Eng. Log. Para etc.) 25. SUBMITTED BY (Typed name, grade and title of Subordinate Command/Agency or Project Initiator) 28. APPROVAL RECOMMENDED BY (MACOM/Apricy) 20. OTHER REMARKS (Confd) 27. APPROVED BY

RSH.

SUBJECT		AEP NO		
		SHEET	, OF	
	G. FALON	DATE	14/90	
DESIGNER	P. HUTCHING		111/90	
CHECKER	P. Flu ICHING	DATE	10/40	

FRONT GP-X-6 CHANGE INCINERATOR FURL TO NATIONS
INCINERATOR FUEL COST SAVINGS

FUEL OIL SAVINGS = 86,217 MBPL/yr

NAT GAS INCREASE = 86,217 MRTU/yr

Current energy costs: 86,217 + 4,27 = \$368,148/yr.

New energy costs: # 289,689/yr.

Daving = \$ 18,458/yr.

HunTer

Telephone Call Confirmation

Project No. 290 - 03 79 - 000
Local L.D. X Placed X Rec'd. Date 5-31-90 G. F. Conversed With Pat ZEEK Of Reaford (U.S. GRUM'T) Regarding Jas line for increation
Incinciator Gas line - Rast study citation. Dato of Study - 37 '86 Scope of work - 1e: Incinerator Burners new? NO Total installed cost - #142,960 +
Anny Energy Savings? - NO.) How Much - "Put or Pay" Contract With Au Company is unclei negatiation and proceeding slowly.
Original 4 87-130,000/40. saning.
Because of fuel sil and natural year price fluctuation Radford projects as 25-30% Cost saving to smith to natural year.
Cost saving to sewith to nacual gas.
Distribution:

ECAM

ECO Number: FN-U-1

COVER THE WATER DRY TANKS WITH HOLLOW PLASTIC SPHERES

<u>Description</u>

The water dry process is used to remove residual ether and alcohol left in the propellant after the solvent recovery process. Open tanks filled with water heated to 149f are used to purge the solvents from the propellant. These tanks are about nine feet high and have a diameter of 16 feet. Approximately 730 MBtu per year of heat is lost from the surface of each water dry tank. Over 86 percent of these losses is due to evaporation and the remainder is conduction.

The surface heat loss can be significantly reduced by adding a layer of two-inch hollow plastic spheres. These spheres would reduce the exposed surface area (the driving force for evaporation) by 85 percent and also improve the U-value of the surface by a factor of two.

Recommendations

Based on the Life Cycle Cost Analysis, it is recommended that two-inch hollow plastic spheres be used on the surface of the water dry tanks.

Construction Cost	=	\$49,899
Annual Energy Savings (coal)	=	14,421 MBtu
Annual Energy Cost Savings	=	\$23,218
Additional Purchased Electricity	=	\$ 9,143
Reduced Power House O&M	=	\$9,379
Net Cost Savings	=	\$23,454
SIR	=	4.68
Simple Payback	=	2.14 years

PRO FIS	LIFE CYCLE COST ANALYSIS SUMMARY STUDY: BALLS ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.035 INSTALLATION & LOCATION: RADFORD AAP REGION NOS. 3 CENSUS: 3 PROJECT NO. & TITLE: FN-U-1 COVER WATER DRY TANK WITH PLASTIC BALLS FISCAL YEAR 1990 DISCRETE PORTION NAME: WATER DRY TANKS ANALYSIS DATE: 10-02-90 ECONOMIC LIFE 15 YEARS PREPARED BY: W. TODD									
1.	E. SALVAGE	OST REDIT CALC (1			-	\$ 49899. \$ 2745. \$ 2994. \$ 50074. \$ 0. \$ 50074.				
2.	ENERGY SAVI	NGS (+) / COS TE ANNUAL SAV	ST (-) /INGS, UNIT (COST & DISCOU	NTED SAVINGS					
	FUEL			ANNUAL \$ SAVINGS(3						
	A. ELECT B. DIST C. RESID D. NAT G E. COAL	\$ 4.27 \$.00 \$.00	0. 0. 0. 0. 14421.	\$ C \$ C	8.78 12.34 1. 12.05 1. 12.48 3. 10.01					
	F. TOTAL		14421.	\$ 23218	3.	\$ 232410.				
3.	NON ENERGY	SAVINGS(+) /	COST(-)							
	(1) DIS	RECURRING (+/COUNT FACTOR	(TABLE A)		9.11	\$ 236.				
	(2) DIS	COUNTED SAVI	NG/COST (3A	•		\$ 2150.				
	C. TOTAL NO	N ENERGY DISC	COUNTED SAVI	NGS(+) /COST((-) (3A2+3Bd4)	\$ 2150.				
	(1) 25% A B C	IF 3D1B IS =	RGY CALC (2F OR > 3C GO 3C CALC S > 1 GO TO	5 X .33) TO ITEM 4 IR = (2F5+3D]	\$ 76695 1)/1F)=					
4.	FIRST YEAR	DOLLAR SAVING	GS 2F3+3A+(3	B1D/(YEARS E	CONOMIC LIFE))	\$ 23454.				
5.	TOTAL NET D	ISCOUNTED SAY	VINGS (2F5+3	C)		\$ 234560.				
6.		SAVINGS RATION SJECT DOES NO		(SIR)=(5	/ 1F)= 4.68					
7.	SIMPLE PAYB	BACK PERIOD (ESTIMATED)	SPB=1F/4	2.14					

REYNOLDS	S. SMITH AND HILLS S. ENGINEERS. PLANNERS	SUBJECT RA COVEY WATER DESIGNER W CHECKER	Dry Tank S T. Todd P. Hutchins	D.	EP NO	4-90
-	Assumptions:	*			٠.	
	1. Heat losses are neglec difference	due to ted due and being	radiation to the lindoors.	from the	ne tan	k .e
	2. Heat losses are negelection the b	s due to ted due uilding.	convection to the	from t still ai	he tan v condi	Kions
	3. The average 60% RH,	ge voom 1 56°F den	conditions point.	are 70) of db,	
	4. The Lank Viar, Indu					,
	5. The tank inventory	diameter printont.	is 16 Fe	et. RA	AP bui	lding
	6. The evapore equation:	ation rate $\left(\frac{15}{nr}\right) = \frac{1}{2}$	is given A (95+0.425 Y	by th	e follon Pa)	sing
	ASHRAE HVA					
_	Calculations:					
	Area of surfa	. = .	= 17×(8 ft)2	= 201 F	t ²	
	4 Conduction	<i>J</i>	and the second of the second o			

QEVAPORATION = M (CVAP + CP* AT)

REYNOLDS	5. SMITH AND HILLS 5. ENGINEERS PLANNERS INCORPORATED	SUBJECT DESIGNER CHECKER	Cover Wat W.T.J	····-	Si	EP NO	OF
	Plastic Spheres (la	ntinneo	(ℓ) :				
	Utop = 1/RAIN =	1/0.68	= 1.47	Btu/hr	.ft?of		
	AT = 149°F	- 70 °F	= 79 05				
	Y=hfg=heat of v	apovi 20	tion @ 14	9°F = 100	08.3 Btu	Ib Ta	SHRAE FUND. ble4, p.6.15
	Cp = Btu/1	b.°=					
	V= air velocit	γ = 1 ·	ft/min				
	Pw= Sat. Vapo	r Press.	_ @149°F ≈	Ps = 7.39	t in.Hg.	As	SHRAE Fund. ble 2, p.6.8
	pa = Sat. Vapor						SHRAE Fund. ble 2, p.6.6
	$\dot{m}_{evap} = \frac{201}{1}$	95 + 0.42 008	(7.30	14-0.452)	= (1b	/hr)	
	Mevap = 132	16/hr					
	FY 89 WD Cyc	les = 1	12 ×106	#NC X	25×106 #	NC = .	377
	377 WD Cycl	es ÷ 15	Active b	oldgs = 2	tanks/bl	dg = 12	6 Cycles tank
	FY 88 cycles/to	ank = 1	181 wo c)	cles ÷ 8	bldgs ÷ 2	tants en	= 11.3
	Use ~	12 wo	cycles/t	ank per	ryear		
	Average cycle	time	= 65000	hours x	t day = 1	5 days cycle	$= 360 \frac{hrs}{cycle}$

12 cyc/yr × 360 hr/cycle = 4320 hours/yr

REYNOLDS.	SMITH	AND	HILLS
ARCHITECTS .	ENGINEE	RS • PL	ANNERS
IN	ICORPORATI	ED	

SUBJECT COVER Water Dry Tank	AEP NO
DESIGNER W. T. Jodd	

Plostic Spheres (Continued):

$$Q_{\text{Evap}} = 132 \frac{16}{hv} \times 4320 \frac{hr}{4r} \times \left[1008.3 \frac{Btu}{16} + 1 \frac{Btu}{160F} \times (149-53)F \right]$$

$$Q_{\text{Evap}} = 570,240 \frac{16}{yr} \times \left(1008.3 \frac{Btu}{16} + 96 \frac{Btu}{16} \right) = 629.7 \frac{MBtu}{4r}$$

Exposed Ensface Area Reduction By Addition of Plastic Spheres:

minimum:

Maximum = 0.884 (See attached calculations)

Assume 2" plastic spheres with a 1.5" air space

Neglect R-Value of plastic

Minimum RAISPACE = 0.77 Flz.hr. OF 1981 ASHRAE Fund.
Raje 23.13, Table 2

Usurface = 0.85 x 0.69 Btn + 0.15 x 1.47 Btn | Btn / hr-ft2-0F

EYNOLDS, SMITH ARCHITECTS + ENGINEERS	AND HILLS 5 PLANNERS DESIGNER	Cover Water Dry T. W. T. Todd	SHEETOF
Plastic	Spheres (Continued	<u>()</u> :	
Reond	new = VAAT =	0.31 Btn x 201.	Ft2 x 79°F x 4320 m/yr
	= 55.6	MBtu/yr	
REvap	.new = PEvap x	(1-0.85) = 629.7	mBtu x 0.15
•• •	= 94.5	mBtu/yr	
		 .	
Steam	Savings:		
Sav	ings = Qoid - Que	* No. Tanks	
	_		74.5) moto] * 2 Tanks * 8 1
Sav	ings = 9286.4	m Btu/yr	
		# *	
Coal S	iavings:		
Sav	ings = Steam Savi-	eteam Awings :	Dist, losses
Én	egy = 9286.4 mg	* 1.32 - 0.85 = 1	4,421.2 mBtu
Cos	t = 14,421.2 motor	× (-61 /mote = \$2	3,218 /yr
Electric	- Purchase Eff	ed:	n stue = \$9143/yr
Cost	makue -		# 2112

\$ 1.01 * 9286.4

REYNOLDS, SMITH AND HILLS ARCHITECTS • ENGINEERS • PLANNERS INCORPORATED	DESIGNER THE	SI	EP NO
Plastic Spheres Non-Energy No	((outinued):	- SIV3 =	236 Jun
Cost Savings			7 0
_	Coal # Savings -		
	23,218-9143+93	1.9). /yr= * 23,6	+54 /yr
Construction Co	ost:		
Project (Cost = \$49,899	See Consti Estimate	vuction Cost Sheet.
2" polyprop	ylene or HDPE	hollow sphere	S .
500 balls x Tr	$\frac{D^2}{t} \times \frac{1fe^2}{144in^2} = 500 \times \frac{1}{16}$	$\frac{T}{14} \frac{Ft^2}{case} = 10,$.9 ft²/case
10.9 Ft²/case	2 -0.85 (% cover)	= 12.8 Ft2 cove	erage percase
201 Ft ² ÷12.	8 ft/ease = 15.7	1 3 16 cases	/tank
Simple Paybac	 k		

Payback = Cost = Savings = \$49,899 + \$23,454/yr = 2.1 years

Non energy savings = 9286,4 moths x 1.01 mptn = \$19379

CONSTRUCTION COST ESTIMATE				June L	t. 19	90 SHEET	6 of
PROJECT ENERGY ENGINEERING ANALYSIS					BASIS FOR ESTIMATE CODE A (No design completed) CODE B (Preliminary design)		
RADFORD ARMY AMMUNITION PLANT							
ARCHITECT ENGINEER] CODE C (Final de THER (Specify)	eign)
REYNOLDS, SMITH AND	D HILLS	A.E.		ήC.			A 6
NA				· Todd		CHECKED BY	tchins
Plastic Balls SUMMARY	QUANTI	TY	PER	LABOR	PER	MATERIAL	TOTAL
	B.	MEAS.	UNIT	TOTAL	UNIT	TOTAL	COST
2" Plastic balls	16	Case	2.50	40.00	123	1968.00	2008.00
Subtotal				40.00		1968.00	
Location Adjustments			0.683	(12.68)	1.002		
Sales Tax					4.5%	, 88.74	
FICA/ Insurance		•	20%	5.46			5.46
Subtotal							2093.46
Overhead	15 %						314.02
Profit	10 %				-		240.75
Performance Bond	170						26.48
RAAP Support	6 %						160,48
Contingency	10%						283.52
Construction Cost	per	Ta					3118.71
			81	mildings x 2	tanks	16lda	× 16
						. "	"
Total Construction (ost						# 49,899.36
				•			
				-			
	[<u> </u>	
			.0.0	1			
Source: Vendor Qu	ote f	rom	Mid	l-America	Pla.	tics, Sha	Kopee, MN
	1				t	1	†

As: Surface Area = 60×80

Ac= Circle Avens = 6 ×9× MD2

C= % Coverage = Ac x100

C= 9×11 ×100 = 91 ×100 C= 6×9× 100 60×80 × 100

88.4%

101 -0-

Cover Water Dry Tanks Grains of moisture per pound of dry air Based on Statistical Abstract of the United States, 1987 Data PSYCHROMETRIC CHART Ambiant Londitions: 58°F db 50°F wb R S H 38 (3-63) **Normal Temperatures** Water Dry House Dry Bulb

ŀ	800-468-1501		Project No	2900379-	000
	800-400-1501	Disast	David	Data	6/4/90
Local	800-46B-1501 L.D. odd	Placed	Rec'a	Date _	0) ()
Of Mid-	America Plast	ोटड Regar	ding <u>Hollow</u>	Plastic S	pheves
D:a = 3/0	4" 1000	#39.40 / 10	ase + shi	pping	
1	12" 1000	\$143.50			
2		\$123.00			
4	" 100	#203.00	,		
PI	0	NO6			
101	yPropylene or H	DPE			
					
		(70 france	s voduction	1
			38,3 Eva	D. redution	
		6	9.5 %	Fuel sovings	
				1	
///	ites with oth	1- 11-	/ \ (
	Terr Dick Tan	er bund our	4.45) A.A.	41(000)	
	· · ·				
bary L	will fax pro	educt info t	to me too	day.	
	•				
Distribution:					

ONE 4-90 MOV 9:49 MID AMERICA PLOTOS 18 18 18 18

MID-AMERICA PLASTICS, INC.

Plastic Specialists / Fabrication & Distribution 700 Industrial Circle So. Shakopae Minniagota (6337) 612/445-7667 / FAX# 612445-2504

DATE:

го:

ATTN: BILL TODOLX

Number of pages (Including this cover page): C

REGARDING:

ZNTO ON PLATE Balls

SIGNATURE () ANY LYON

Mid-America Plastics, Inc.

MAP FLX # (612) 445-2974

LSTCS MON



CUT HEAT LOSSES! SAVE FACTORY MAINTENANCE ! IMPROVE SAFETY REMOVE FUMES AND ODORS

PROVEN to Reduce Fuel Costs 19.5% Recluces Fumes 90% Reducas Evaporation 84.3% ALL PLASTIC FLOATING SPICERES

Spheres float on surface of tiquid in open tank and thereby greatly reduce the exposed tiquic surface aren — up to 10%. Chambatcally diminshes objectionable furnes and coors. Blanket of ach no also insulates: heated liquid reducing evaporation and heat requirem

ideal for plating tanks and similar open tank installations where the figured surface can be covered with a blanker of spheres without impeding access to the tank for process purposes:

Sphere: die hollow and will float on any liquid. Fully round. No welt or tim on which chemicals can deposit and being smooth they ensure a much tighter surface cover.

Polypropylene non-texic and able to withstand continuous working temperatures of 110°C (23c°F) polypropylene is suitable for use in most

known chemicals. High density Polyethylene generally suitable as above but with a continuous working temperature limitation of SOC (176°F) softening point soout 110°C (230°F). High density polyethylene has better chemical resistance to derlain compounds like oil, and other hydrocarbons. Also less stress cracking at low temperatures than colymposeem. Color white translucent except 100 MM, black for outside use.



FIGH BENSITY POLYPROPYLERS Prite Pr

MID AMERICA PLASTICS INC. Plasito Spacialists / Fubrication & Distribution

700 hidustrial Circle S. Strakoree I dinnegota 55:376 Phone 612 445-7867

APPLICATIONS

METAL WERKING - In Pleasing and Chromating

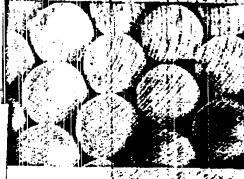
Tanks.
PLATINIS: Manual Chromium Line Reduces Spray

Splashing PETROLEUM: Air Pollutica, Novious Odors, Waste Collection Pits. FOCID: Reduces Vapor, Small in Bacon Manufac-

turing.

POWER STATION: Surge Tank Reservoir of Hot Boiler -- Ho Steam.

SWIMMING POOLS: Reduces Heat Loss



Linn 138 ECO Number: GP-N-8

REPLACE INCANDESCENTS WITH COLOR-CORRECTED HPS SCREW-INS FOR EXPLOSION-PROOF

FIXTURES

<u>Discussion</u>

Many buildings at RAAP are lit by inefficient incandescent lighting for interior areas. This ECO evaluates replacement of the incandescent lamps in explosion-proof fixtures with 50 watt color-corrected HPS units, which consist of HPS lamps and ballasts with a medium base adapter which screws into the incandescent socket. These lamps have been color-corrected to produce a whitish light rather than a yellowish light usually associated with HPS. At the present time, these lamps are only produced in this wattage (50 W). Light levels will be decreased 33 percent when 200 W incandescents (3,710 lumens) are replaced by 50 W color-corrected HPS (2,500 lumens). When 150 W incandescents are replaced by 50 W color-corrected HPS, light levels will decrease 13 percent, from 2,880 lumens to 2,500 lumens.

Recommendations

Based on the Life Cycle Cost Analysis, it is recommended that 50 W HPS screw-in retrofits be installed in the interior incandescent explosion-proof fixtures.

Construction Cost = \$147,062

Energy Savings = 2,354 MBtu/yr

(electricity)

Cost Savings = \$31,081/yr

SIR = 1.87

Simple Payback = 4.8 years

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LCCID 1.035 INSTALLATION & LOCATION: RADFORD AAP REGION NOS. 3 CENSUS: 3 REPLACE INCAND. W/ COLOR-CORRECT HPS PROJECT NO. & TITLE: GP-N-8 DISCRETE PORTION NAME: TOTAL FISCAL YEAR 1990 ANALYSIS DATE: 10-05-90 ECONOMIC LIFE 15 YEARS PREPARED BY: T. TODD 1. INVESTMENT 147062. A. CONSTRUCTION COST 8089. B. SIOH 8824. C. DESIGN COST 147578. D. ENERGY CREDIT CALC (1A+1B+1C)X.9 0. E. SALVAGE VALUE COST 147578. F. TOTAL INVESTMENT (1D-1E) 2. ENERGY SAVINGS (+) / COST (-) ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS DISCOUNTED DISCOUNT UNIT COST SAVINGS ANNUAL \$ SAVINGS(3) FACTOR(4) SAVINGS(5) \$/MBTU(1) MBTU/YR(2) FUEL 183218. 8.78 2354. 20868. A. ELECT 8.87 0. 12.34 0. \$ 0. .00 B. DIST .00 \$ 12.05 0. 0. \$ 0. C. RESID 0. 0. 0. \$ \$ 0. 12.48 D. NAT G \$ 0. 10.01 0. E. COAL .00 2354. \$ 183218. 20868. F. TOTAL NON ENERGY SAVINGS(+) / COST(-) 10213. \$ ANNUAL RECURRING (+/-) (1) DISCOUNT FACTOR (TABLE A) 9.11 93040. (2) DISCOUNTED SAVING/COST (3A X 3A1) C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) /COST(-) (3A2+3Bd4) \$ 93040. PROJECT NON ENERGY QUALIFICATION TEST \$ 60462. (1) 25% MAX NON ENERGY CALC (2F5 X .33) A IF 3D1 IS = OR > 3C GO TO ITEM 4 B IF 3D1 IS < 3C CALC SIR = (2F5+3D1)/1F) = 1.65 C IF 3D1B IS = > 1 GO TO ITEM 4 D IF 3D1B IS < 1 PROJECT DOES NOT QUALIFY 4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1D/(YEARS ECONOMIC LIFE)) \$ 31081. 276258. 5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) (SIR)=(5 / 1F)= 1.876. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY)

7. SIMPLE PAYBACK PERIOD (ESTIMATED) SPB=1F/4

STUDY: GPN8

4.75

	SUBJECT	RAAP Lighting F	rojects	AEP NO 290 0379	000
EYNOLDS, SMITH AND HILLS			J	SHEETOF	10
RCHITECTS • ENGINEERS • PLANNERS INCORPORATED	DESIGNER	T. Todd		DATE	••••••
	CHECKER			DATE	
GP-N-8 REPLACE	INCAN	DESCENTS WITH	WLOR-C	orrected HP	<u>S</u>
SCREW-IN	S FOR	L EXPLOSION PRO	OF FIXTUT	res	
					<u> </u>
(a) culationes were made	he ou a	a per-muit basis	for just	alling 50 W	
HPS color-corrected,	mito w	other the wister	ig efflosi	on-proof	
the policy confidence	<u> </u>		ナザ	V	:
includescent fixture Only areas operating 3 & From the building Au	s. the	per-unt calcula	ctrow are	ou page Z.	
Only areas operating 3	shifts / de	by 5 days whe is	erl Comi	level ()	1.0
From the bulding su	wey de	eta, a list of the	e bulding	go with poten	nac
incondercent lighting	projec	to was compiled	(page 3), It is	
assumed for this E	10 4	lat 90% of The	e wheno	r fireway	
explosion groof and can	is fu	crost-red in tub	Manne	o, Exact acres	
11		and the second s	- 4.		
of fixtures and screw	- M. / !	a cospess yar war	<u> </u>	7)	
	_	. •			••
Total fixtures - 0.	.9				
Everay Savings = 2	t99 kuit	i v 0.003413 MBf	x x 1382-	fixtures = 2354.	MEtu
Energy Savings = 2	yv	Kush	,		y
	_				
Emoray cost surings =	= \$ 15,11	<u>+ 1382 = \$</u>	20,882/	1	
<i>O</i>	yr-tix	eture			
	•			1	
Holl & Labor Cost So	wings =	47.39 1382	+10,2	12/91	
		grint.	- \$ 21 6	ar 14.0	
Total cost savings	5 = 70,	882 + 10,213	= 151,00	92 19r	
	110 15	1387 = \$11	1.2 a74		
Project cost =	fixture	X 1302	۱۱ ایک رو	`	
((m charchine	cost =	+ \$163 974 /1.115	= \$14	7,062)	
CONSTRUCTOR		+163,974/L.115		, , , , , , , , , , , , , , , , , , ,	
Simple truback	1163	974 - 5.3	3 40		_
Simple payback	\$ 31.1	95 Tur	0		
Company of the Compan	. 1	- 10		1	

REYNOLDS. SMITH AND HILLS ARCHITECTS · ENGINEERS · PLANNERS	SCHERNING Calcs. DESIGNER T. Todd	rojects AEP NO 290 0379000 SHEET 2 OF 10 DATE
GP-N-8 Replace inter	ion 150-200 W in conc	lescents with 50 W HPS
- Assume color rev 50 W HPS (color exceed requirement	dition is important in chosen ents.	a this area, so the even though lumens
Energy Savings = (150	8 W - 70W) x 24 hr x	760 days = 499 kwk
Energy cost sovings	= 499 kwh x \$0.03	026 - \$15.11 & yr
Labor & Matlcost sa	rings - (Inraud cost - 750 hr	HPS cost) x 6240 hr yr
=[(\$2.11 mate + \$1.20) 750 m	$\times (240 \text{ hr}) = \frac{430.}{4}$	00mete + \$6.45 labor × 0.683 × 1.2) 12,000 hr 7.39 yr
total cost savings	$= \frac{15.11}{yv} + \frac{7.39}{yv}$	= \$ 22.50 yr
Matl cost = \$ 67.00	for fixture w/lamp	(1390 venaor into,)
	1.20 rtolit x 1, 2 exp : 12	
		x \$1.18)] x 1.661 = \$118.65
	$\frac{$118.65}{$22.50/yv} = 5.3$	

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1404 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10		200
1611 -00	Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
	Dry House #4 (Cure Grain)		7	8	56
	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
	Boiling Tub House		3	50	150
2022 -00	Beater House	NC. B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3	30	90
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	50	150
4912 -40	Forced Air Dry House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
4912 -03	MK 43 Sawing and Inhibiting	Cast Prop. (Rocket)	1	4	4
4915 -00	Small Grain Mold Assembly		1	7	7
4921 -00	Inspect/Clean NG Tanks *	Cast Prop. (Rocket)	1	21	21
4951 -02	TOW Launch Saw House	Pilot B	1	8	8
50 08 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	ist R P	i	20	20
7113 -00	Roll House (Rolled Powder)	ist R P (F-Line)	1	130	
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST	ESTIMA"	ΓΕ		DATE PREPARED 6/90		SHEET 4	or 10
OJECT ENERGY ENGINEERING	ANAL YS	TS			BASIS FOR		
RADFORD ARMY AMMUN	 				1	ODE A (No design of E.B. (Proliminary des	
RADFORD ARTH APPROX	1111011	LANI				ODE C (Finel desig	- -
REYNOLDS, SMITH AN	HILLS			NC.		ER (Specify)	
GP-N-8		ESTIM	T. Too	d d	c	HECKED BY	
Incard to 50W HPS SUMMARY	QUANT			LABOR	МА	TERIAL	
MULLIA TO JOW III SUMMARY	NO. UNITS	UNIT	PER	TOTAL	PER	TOTAL	COST
Replace incandescent	1382	fixt	1.18	1631	67.00	92594	94225
lamps with 50 W HPS							
screw-in retrofits							
Sales Tax	4.5%					4167	4167
FICA/Insurance	20.0%			326			326
Subtotal				1957		96761	98718
Overhead	15.0%						14808
Profit	10.0%						11353
Performance Bond	1.0%						1249
Hercutes Support	6.07.						7568
Contingency V	10.0%						13370
Construction Cost							147066
			····				
						·	
							
			···				
	<u> </u>						
	7						

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SCP ENERGY CONSERVATION PRODUCTS, 511 CANAL STREET, NYC, NY, 10013—TEL (212)-925-5991

POWER CONSUMPTION AND LUMEN CUTPUT DATA

WATTS	LINE WATTS	TOTAL LUMEN CUTPUT	LUMENS PER WATT	HOURS OF RATED LIFE
	Y VAPOR (DELUX	E WHITE) 63000	59	24000
1000 400	1075 450	23000	5 6	24000
400 250	290	13000	42	24000
175	205	8500	49	24000
100	120	4500	42	24000
75	93	3150	37	16000
50	61	1680	31	16000
****** METAL	HALIDE			
1500	1600	155000	103	3000
1000	1100	110000	100	12000
400	460	34000	85	15000
175	210	14000	85	7500
======================================	RESSURE SODIUM			
1000	1080	140000	130	24000
400	480	50000	104	24000
250	310	27500	89	24000
150	200	16000	8 0	24000
100	135	9500		24000
70	25	5800	68	24000
70 (50) (35)	\overline{O}	4000	57	24000
	(42)	2850	67	(18000)
********FLUORES	CENT			
FRAIGHT 40	48	3150	66	20000+
IRCLINE 32	3 7	1830	5 0	12000+
IRCLINE 22	25	1050	42	12000+
IRCLINE 20	23	850	37	12000+
WIN TUBE 13	16	9 00	5 6	10000+
WIN TUBE 9	12	6 00	50	10000+
TRAIGHT 8	11	400	36	7500+
WIN TUBE 7	10	400	40	10000+
TRAIGHT 6	9	300	3 3	7500+
WIN TUBE 5	8	250	31 ====================================	10000+ =================================
	DESCENT		and an agreement	1000
1000	1000	23740	24	1000
750	750 500	17040	23	1000
500	500	10850	22	1000
200	200	<u> </u>	19	750 750
(50)	150	2880	19	750
100_	100 75	1750 1190	18 16	750
75		=====================================	======================================	, 30 ====================================
	S—IODINF.	25000	7.4	3000
1500	1530	35800	24	20 00
± 1000	1000	23400	23	26 00
* 50 <u>0</u>	500	10950	22	
250	250	4850	19	2000

LAMP	WATTAGE	APPX	AVERAGE	STUUDARO	
		LUMENS	UFE HRS.	CASE OTY.	
RAPID START FLU	ORESCE	NT U LAMPS	3		
FB40/U6/CW/EW	34	2,600	12,000	12	
FB40/U6/CW	40	2.950	12,000	12	
INSTANT START S	LIMLINE	FLUORESCE	NT LAMPS		
F72T12/CW	55	4.550	12.000	12	
F96T12/CW/EW	60	5.600	15.000	15	
F96T12/CW	75	6.200	12.000	13	
HIGH & VERY HIG	H OUTPL	IT FLUORES	CENT LAM	IPS	
F96T12/CW/H0/EW		8.300	12,000	15	
F96T12/CW/H0	110	9.200	12.000	15	
F96T12/CW/VHO/EW		14,000	12,000	15	
F96T12/CW/VH0	215	15.500	12.000	15	
METAL HALIDE U	MINEDOA	I BUDD ME	NIIIM DAGI	POMALI	
	35	2.300	5.000	12	
MH35/U MH50/U	50	3.400	5.000	12	
MH70/U	. 30	5.500	5.000	. 12	
MH100/U	100	7.2 00	7.500	12	ĺ
MH150/U	150	12.000	10.000	12	
				- 	
METAL HALIDE U					
MH175/U	175	14,000	10.000	12	
MH175/C/U	175	14.000	10,000	12	
MH250/U	250	20.500	10.000	12	
MH250/C/U	250	20.500	10.000	12	
MH400/U	400	36.000	20.000	6	
MH400/C/U	400	36,000	20,000	6	
MH1000/U	1000	110.000	12.000	6	
MH1000/C/U	1000	105,000	12,000	! 6	

150

250

400

35

35 50

50

70

70

100

100

150

150

COLOR IMPROVED HIGH PRESSURE SODIUM LAMP

HIGH PRESSURE SODIUM MEDIUM BASE LAMPS

HQI 150

HQI 250

-01 400

35.MED ف

LU50/MED

LU70/MED

LU35/D/MED

LU50/D/MED

LU70/D/MED

LU100/MED

LU150/MED LU150/D/MED

',HT50SDX

LU100/D/MED

11.000

19.000

25.000

2.250

2.150

4 000

3.800

6.300

5.985

9.500

8.800

16.000

15.000

10.000

10.000

10 000

16.000 16.000 24.000

24.000 24.000

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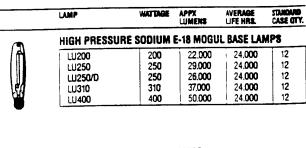
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LOW PRESSURE SODIUM LAMPS									
SOX10 SOX18 SOX35 SOX55 SOX90	10 18 35 55 90	1,000 1,800 4,800 8,000 13,500	9,000 14,000 18,000 18,000	20 20 12 9					
S0X135	135 180	22,500 33,000	18,000 18,000	9					



1R16 LOW VOI	JAGE 12V TI	JNGSTEN H	ALOGEN LA	WL2
ESX (N)	20	3.300	2.000	20
BAB (W)	20	: 460	2.000	20
EYR (N)	42	7.300	2.000	20
EYS (M)	42	2.500	2.000	20
EYP (W)	42	1,200	2,000	20
EXT (N)	50	9.150	3,000	20
EXZ (M)	50	3.000	3,000	20
EXN (W)	50	1.500	3,000	20
EYF (N)	75	11.500	3.500	20
EYJ (M)	75	4.500	3.500	20
EYC (W)	75	2.000	3.500	20



A/JDR75W/N 7		6.300	2.0 00	1 12
	5 5	3.500	2.000	12
	5	2.100	2.000	12



M/JDR75W/N	75	6.300	2.000	12
M/JDR75W/M	75	3.500	2.000	12
M/JDR75W/W	75	2,100	1 2. 000	12
M/JDR100/N	100	8.500	2.000	12
M/JDR100/M	100	4 500	2.000	12
M/JDR100/W	100	3.000	2.000	12



MR16 LINE VOLTAGE 120V INTERMEDIATE BASE TUNGSTEN HALOGEN LAMPS										
I/JDR75W/N	1 75	6.300	2.000	12	1					
I/JDR75W/M	75	3.500	2.000	12						
I/JDR75W/W	75	2,100	2.000	12	-					
1/JDR100/N	100	8.500	2.000	12	-					
1/10R100/M	100	4 500	2.000	12	- [



		2.200	2.000	1 12
I/JDR75W/N	1 75	6.300	2.0	! -
I/JDR75W/M	75	3.500	2. 000	12
1/JDR75W/W	75	2.100	2.000	12
/JDR100/N	100	8.500	2 000	12
	100	4 500	2.000	12
I/JDR100/M				12
#JDR100/W	100	3 000	2.000	



TUNGSTEN HALOGEN LINE VOLTAGE MEDIUM BASE TUBULAR LAMPS										
64484/CL	: 75	. 1 200	2.000	15						
64484/FR	75	1.140	2.000	15						
64486/CL	100	1 600	2.000	15						
64486/FR	100	* 520	2.000	15						
64 488/CL	150	2,750	2.000	15						
04400/CL	130	0.000	2.000	15						



64484/CL 64484/FR 64486/CL	75 75 100	1.140 1.600	2.000 2.000 2.000	15 15 15
64486/FR	100	520 2,750	2.0 00 2.0 00	15
64 488/CL 6 4488/FR	150 150	2.622	2.000	15



DOUBLE ENDED L		VOLIAGE			
0100T3/CL 0150T3/CL 0200T3/CL 0300T3/CL 0500T3/CL 01500T3/CL	100 150 200 300 500 1500	600 2,800 3,600 6,000 11,000 33,000	200 200 200 200 200 200 200	12 12 12 12 12 12 12	



0=0

24.000 12 LU50 50 4 000 _J50/D 50 3.800 24.000 ٠2 12 12 1070 1070 1070/0 10100 70 70 6.300 24.000 5.985 24.000 100 9.500 24.000 12 12 12 12 LU100/D 100 8.800 24.000 150 16.000 24.000 LU150/55 LU150/55/D 150 15.000 24.000

HIGH PRESSURE SODIUM ED-231/2 MOGUL BASE LAMPS

GP-N-8

77	66_	Lighting											
					DAILY	MAN-			BARE	COSTS		TOTAL	
	16	6 100 Lighting	CR	FW	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL CEP	
		90 watt		Elec	.30	26.670	С	5,140	645		5,785	6,600	140
140	1600	135 watt			.20	40	Ĭ	6.905	97 0		7.875	9.025	
ł	1700	180 watt			.20	40		7,308	970		8,278	9,475	ĺ
	1750	Quartz line. clear, 500 watt			1.10	7.270	1	1,872	175		2.047	2,325	
ł	1760 I	1500 watt		\vdash	.20	40		3,427	970		4,397	5,200	
	1800	Incandescent, intenor, A21, 100 watt			1.60	5		173	120		293	370	
ł	1900	A21, 150 watt	T	_	1.60	5		(211)	(20)		331	410	1
- 1	2000	A23, 200 watt			1.60	5		227	120		347	430	
ł	2200	PS 30, 300 watt	\vdash	<u> </u>	1.60	5		330	120		450	540	
- 1	2210	PS 35, 500 watt			1.60	5		576	120		696	810	l
-	2230	PS 52, 1000 watt	\vdash		1.30	6.150		1,525	150		1,675	1,900	
		PS 52. 1500 watt			1.30	6.150		2.382	150	:	2,532	2,850	
ł	2240	R30, 75 watt	\vdash		1.30	6.150		375	150		525	630	
	2300	R40. 150 watt	1		1.30	6.150		408	150		558	670	ł
ŀ	2400	Fxtenor, PAR 38, 75 watt	╁╌		1.30	6.150		566	150		716	840	i
- 1	2500	PAR 38, 150 watt	l		1.30	6.150		525	150		675	795	l
	2600	PAR 46, 200 watt		+	1.10	7.270		1,928	175		2,103	2,375	1
	2700	PAR 56, 300 watt	1		1.10	7.270		2,193	175		2.368	2.675	1
ı	2800	Guargs, fluorescent tamp, 4' long	\vdash	+	1	8		375	195		570	695	1
	3000	8' long	1		.90	8.890		535	215		750	905	ļ ·
	3200	RESIDENTIAL FIXTURES	╁	<u>. </u>	.30	0.000				<u> </u>			145
145		Fluorescent, interior, surface, circline, 32 watt & 40 watt	١,,	Elec	20	.400	Ea.	48	9.70	i	57.70	67	1
	0400	2' x 2', two U 40 watt	╁		8	1	T	66	24		90	110	1
	0500	Shallow under cabinet, two 20 watt			16	500		45	12.15		57.15	67	
4	00	Wall mounted, 41, one 40 watt, with baffle	十	+	10	.800		41	19.40		60.40	74	1
		Incandescent, extenor lantem, wall mounted, 60 watt			16	500		36	12.15		48.15	57	1
	2000	Post light, 150W, with 7' post	1	+-	4	2		104	49		153	185	1
	2100	Lamp holder, weatherproof with 150W PAR			16	.500		16	12.15	-	28.15	35	
	2500	With reflector and guard	t	+	12	.667		31	16.15		47.15	58	1
	2550	Intenor pendent, globe with shade, 150 watt			20	400		78	9.70	i	87.70	100	1
450	2600	TRACK LIGHTING	十	1					1				150
150		Track, 1 circuit, 4' section	1,	Elec	6.70	1.190	Ea.	33	29		62	79	1
	0100	9' metro	╁	1	5.30	1.510		48	37		85	105	7
		12' section	1		4.40	1.820		81	44		125	155	
	0200	3 circuits, 4' section	十	1	6.70	1.190		36	29		65	82	
	0400	01	1		5.30	1.510		48	37		85	105	j
	0500	12' section	T	Ť	4.40	1.820		88	44		132	160	1
	1000	Feed kit, surface mounting		İ	16	.500	1	12	12.15	i	24.15	31	
		End cover	+-	†	24	.333		1.98	8.10) i	10.08	14.05	5
	1100	Feed kit, stem mounting, 1 circuit	-		16	.500		16	12.15	i	28.15	35	_
	1200	3 circuit	\top	\top	16	.500		16	12.15		28.15	35	l
	1300	Electrical joiner for continuous runs, 1 circuit	1		32	.250		6.55	6.0	5	12.60	16.10	의
	2000	3 circuit	†	$^{+}$	32	.250		12.10	6.0	5	18.15	22	Ì
	2100	Fixtures, spotlight, 150 PAR	1		16	.500		47	12.1		59.15	70	_
	2200	Walt washer, 250 watt tungsten halogen	T	+	16	.500		101	12.1		113.15	130	
	3000	Low voltage, 25 watt targstor ranged	1		16	.500		102	12.1	i	114.15	130	1
	3100	3 circuit	+		16	.500		109	12.1		121.15	140	
	3120]	•	'		'		1	<u></u>			
	1												

466	Lighting											
				DAILY	MAN-			BARE	COSTS		TOTAL	
	66 100 Lighting	CR	EW	OUTPUT		UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL CAP	
135 5100		1 [Elec	8	1	Ea.	479	24		503	565	135
5110				8	1		500	24		524	585	l
5120				8	1		535	24		559	625	İ
5130				8	1		556	24		580	646	
5140				8	1		525	24		549	615	İ
5150				8	1		556	24		580	645	
5160			•	8	1	•	581	24		605	675	
5190												ļ
5200		1 (Elec	12	.667	Ea.	293	16.15		309.15	345	
5210	250 watt metal halide			12	.667		314	16.15		330.15	370	ļ
5220	150 watt high pressure sodium	i		12	.667		335	16.15		351.15	390	
5230	250 watt high pressure sodium	_		12	.667		360	16.15		376.15	420	ł
5240	8" high 18" x 24", 400 watt metal halide			12	.667		365	16.15		381.15	425	1
5250	250 watt high pressure sodium	_	\sqcup	12	.667		376	16.15		392.15	435 460	ł
5260				12	.667		398	16.15		414.15	380	
5270		┡		12	.667		324	16.15 16.15		340.15 392.15	435	ł
5280		1		12	.667		376 360	16.15		376.15	420	1
5290			\vdash	12	.667 .667		386	16.15		402.15	450	1
5300				12 3.20	2.500		355	61		416	480	
5400		╁	-	2.70	2.960		370	72		442	515	1
5410		ļ		2.40	3.330		398	81		479	555	1
5420		┪	1	3.20	2.500		398	61		459	525	1
5430	250 watt high pressure sodium	1		2.70	2.960		428	72		500	575	
		 	1	2.40	3.330		454	81		535	620	1
) 400 Watt High process would		•		0.000	'						
140 0010) LAMP8	T										140
0080	The state of the s	1	Elec	1	8	С	348	195		543	670	1
0100		Π		.90	8.890		198	215		413	535	1
0120	i			.90	8.890		442	215		657	805	4
0150				.80	10		874	245		1,119	1,325	
0170	44. 65	L	1	.90	8.890		270	215		485	615	4
0200	Slimline, 4' long, 40 watt	ĺ		.90	8.890	1	618	215	1	833	995	
0300	o I - 8' long, 75 watt	┖	<u> </u>	80	10	-	577	245		822	990	-
0350	3' long, 60 watt energy saver	İ		.80	10		603	245	1	848	1,025	1
0400) High output, 4' long, 60 watt	╄	+	.90	8.890	- -	750	215		965	1,150	1
0500	8' long, 110 watt			.80	10		775	245		1,020 1,500	1,725	1
0520		╄	\perp	.90	8.890	\vdash	1,285	215	 	1,560	1,825	-{
0550	8' long, 215 watt			.70	11.430		1.285	275		2,787	3,300	
0600		╀-	<u> </u>	.30	26.670		2,142	645		2.308	2,775	┪
0650	·	1		.30	26.670	1 1	1,663	6 45 6 45		3,613	4.225	1
0700		╀	+-	.30	26.670		2,968			2,985	3,525	1
080		1	i	.30	26.670		2,340	6 45 97 0		6.070	7,025	1
090		╄	+	.20	40	╂╌┼╌	5,100 3,749	645	-	4,394	5,075	1
100			1	.30	26.670	1	1 '	645		5.357	6,125	
110		╀	+-	.30	26.670	_	4,712 4,386	645	 	5,031	5,775	1
120	1	1		.30	26.670 40		9,894	970]	10.864	12,300	1
130		╀	+	.20	40		9,960	970	 	10,930	12,400	1
132		1		.20	40		9.268	970	1	10,238	11,600	1
33		╁	╁	.20	26.670		4,712	(645)		5.357	6,125	1
Ţ.			ļ	.30	26.670	1 1	4,871	645		5,516	6,300	
136	100	╁╌	+	.30	26.670	+	5,059	645		5,704	6,525	7
137				.30	26.670		5.380	645		6.025	6,875	1
138		+	+	.30	26.670	_	5,727	645		6.372	7.250	7
140				.20	40		13.352	970		14,322	16,100	
145	Of math	十	+	.30	26.670		3,963	645		4,606	5,300	
150			1	.30	26.670	1 1	4,386	645	<u> </u>	5,031	5.775	
155	O 1 33 Wall			1.50							19	9

Distribution:

Project No. 290 0379 000
(-719)
Local LD. 851577 Placed Rec'd Date 6-7-90
T. Todd. Conversed With Mr. Singer Of American Scientific ighting Co. Regarding HPS retrofits
Of then a subtra 6. Regarding TITS regrot 13
For retrofits of incandescent fixtures, the "Bulb Lumenight"
and "Colorlight" products are recommended. The lamps are
riplaceable in both and the "colorlight" is more whitish.
Attractore costs linculaing lamb of low quantities of 100+
For retrofits of incandescent fixtures, the "Bulb Lumenight" and "Colorlight" products are recommended. The lamps are replaceable in both and the "colorlight" is more whitish. Intractors costs (including lamp) for quantities of 100 + are as follows:
WHO WE HOLLOWS
Rulh Lymenial + 35 W - \$45 / law ps only
Bulb Lumeniaht 35 W - \$45 (lamps only) 50 W - \$45 (\$16-\$20) (also come in 70 W, 100 W, 150 W)
[4] (1) (1) (1) (1) (1) (1)
Lacso come (k 10 w 100 vo 150 w)
$\frac{1}{2} \left(\frac{1}{2} \right) \left(1$
Colorlight 50W - \$67 (lamps only \$30)
- + 30)
They will send a rope of their rotates for dimensions.



DOWNLITE^{IM} CONVERSION SERIES: COMPACT FLUORESCENT REFLECTOR LAMPS



GLOBE FLECTOR™ LUMA FLECTOR™

- LAMP: Compact disposable fluorescent globe or tubular amp/Standard or tapered base
- REFLECTOR: Highly polished aluminum
- WATTAGE: Fifteen
- WMENS: 1350
- COLOR: Warm wnite/2800k
- USE: Indoor only
- . BURNING POSITION: Any
- · LAMP LIFE: 9,000 hours
- · INSTALLATION: Screws into any 120V medium base socket
- · PACKAGING: Ten conversions per carton

CATALOG NUMBER	LAMP	DIMENSIONS
DGF S/15	BFG15 LE/A	Reflector Diameter 51/4" Overall Length 61/4"
DGF T/15	BFG15 LE/T	Reflector Diameter 51/a* Overall Length 63/4*
DLF S/15	BFT15 LE/A	Reflector Diameter 51/s* Overall Length 63/s*
DLF T/15	BFT15 LE/T	Reflector Diameter 51/s' Overall Length 7"

LINE VOLTAGE/LOW VOLTAGE MR16 HALOGEN CONVERSIONS







HALOGENLITE™ 120V

- · LAMP: MR16 Dichro-Cool tungsten halogen/Medium base or intermediate with medium adapter base and clip on lens/Line voltage/Cool crisp white light 3000k/Dimmable up to twenty five percent/Medium beam spread.
- LAMP LIFE: 2,000 hours/High lumen maintenance
- · INSTALLATION: Screws directly into any ventilated 120V medium base porcelin socket rated above 100 watt/Minimum front diameter opening 43/41
- PACKAGING: Ten lamps per carton

HALOGENLITE"12V

- ADAPTER: Molded Valox^a plastic/Vented to cool internal components
- · FINISH: Black
- LAMP:MR16 Dichro-Cool tungsten nalogen/Low voltage/Stepdown transformer/Dimmable/Cool crisp wnite light 3000k/Natural sunlight appearance
- LIFE: 2000 hours 20 watt/3000 hours 50 watt
- · INSTALLATION: DH 12/20 screws into any medium base porcellin socket rated for 75 watts/DH 12/50 into socket ated for 150 watts
- PACKAGING: Four conversions per carton/Lamp ncluded

CATALOG NUMBER	LAMP	DIMENSIONS
MEDIUM		
DH 120 M/75	JDR75	Lamp Diameter 2"
DH 120 M/100	JDR100	Overall Length 2 5/16"
INTERMEDIATE		
DH 120 I/75	JDR75	Lens Diameter 21/4"
DH 120 I/100	JDR100	Overall Length 53/4"
OPTIONS:		M Medium Beam
R Reflector		Spread 18*
N Narrow Beam	Spread 10*	W Wide Beam Spread 28*

Adapter Diameter 31/4" Overall Length 6"
Adapter Diameter 31/4" Overall Length 73/4" Lens Diameter 5"

EXZ Narrow Flood/50w BAB Fiood/20w EXN Flood/50w ESX Narrow Spot/20w

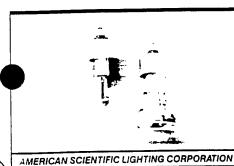
DIMENSIONS

Reflector Diameter 51/4"

Overall Height 81/2"

NHT50 SDX Adapter Diameter 31/8"

COLOR IMPROVED HPS HIGH HAT CONVERSION



COLORLITE 50™

- ADAPTER: Heavy gauge spun aluminum
- FINISH: Caustic etcning
- REFLECTOR: Highly polished aluminum/Vented slots for cool operation
- LAMP COLOR: 2500K LAMP LIFE: 12000 Hours
- INSTALLATION: Adapter screws into a standard 120V high hat fixture/Medium base porcelain socket required/ Fixture rated for a minimum of 150 watts/Minimum front
- · PACKAGING: Four conversions per carton/Lamp included

plameter opening 5

FAX (718) 853-2390 (718) 851-4577 BROOKLYN. NEW YORK TEL. (800) 552-3465

CATALOG

DC/50

LAMP

ECO Number: GP-N-2

REPLACE INCANDESCENTS WITH CIRCLINE FLUORESCENTS

Discussion

Many buildings at RAAP are lit with inefficient incandescent lighting. This ECO analyzes the replacement of interior incandescent lamps with 32 W circline fluorescent screw-in retrofit fixtures. This type of project is suitable for nonexplosion-proof interior fixtures. Replacing 100 W incandescents with 32 W circlines would increase the lumen output by five percent, from 1,750 lumens to 1,830 lumens. Replacing 150 W incandescents with 32 W circlines would decrease the lumen output 57 percent, from 2,880 lumens to 1,830 lumens.

Recommendations

Based on the Life Cycle Cost Analysis, it is recommended that incandescent lamps be replaced with fluorescent circline fixtures.

Construction Cost = \$13,048

Annual Energy = 371 MBtu/yr

Savings (electricity)

Annual Cost Savings = \$6,416/yr

SIR = 4.38

Simple Payback = 2.0 years

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) INSTALLATION & LOCATION: RADFORD AAP REGION NOS. 3 CENSUS: 3 PROJECT NO. & TITLE: GP-N-2 REPLACE INCAND. W/ CIRCLINE FLUOR. FISCAL YEAR 1990 DISCRETE PORTION NAME: TOTAL ANALYSIS DATE: 10-05-90 ECONOMIC LIFE 15 YEARS PREPARED BY: T. TODD												
1.	A. B. C. D. E.	ESTMENT CONSTRUCT SIOH DESIGN CO ENERGY CR SALVAGE V TOTAL INV	ST EDIT ALUE	CALC ()X.9				\$ \$ \$ -\$]	13048. 718. 783. 13094. 0. 13094.
2.	ENE Ana	RGY SAVIN LYSIS DAT	GS (- E ANI	+) / CO NUAL SA	ST (-) VINGS, UN	NIT COST 8	DISCO	UNTED S	SAVINGS			
	FUE	L				S AN R(2) SA			ISCOUNT ACTOR(4			SCOUNTED VINGS(5)
	B. C. D.	ELECT DIST RESID NAT G COAL	\$ 8 \$ \$ \$	3.87 .00 .00 .00	371. 0. 0. 0.	. \$. \$. \$	328	0. 0. 0.	8.78 12.34 12.05 12.48 10.01			28845. 0. 0. 0.
	F.	TOTAL			371.	. \$	328	5.			\$	28845.
3.	NON	ENERGY S	AVIN	GS(+) /	COST(-)							
	Α.	ANNUAL R (1) DISC (2) DISC	OUNT	FACTOR	(TABLE A	N) (3A X 3A1)	ı	9.	11	\$ \$		3131. 28523.
	c. ·	TOTAL NON	ENEF	RGY DIS	COUNTED S	SAVINGS(+)	/COST	(-) (3 <i>A</i>	(2+3Bd4)	\$	2	28523.
	D.	(1) 25% A I B I C I	MAX N F 3D1 F 3D1 F 3D1	NON ENE IS = IS < B IS =	RGY CALC OR > 3C 3C CALC > 1 GO	ATION TEST (2F5 X .3 GO TO ITE SIR = (TO ITEM 4 CT DOES NO	3) M 4 2F5+3D	1)/1F)=	951 2.9			
4.	FIRS	ST YEAR D	OLLAF	SAVIN	GS 2F3+3 <i>A</i>	\+(3B1D/(Y	EARS E	CONOMIC	LIFE))	\$		6416.
5.	TOTA	AL NET DI	SCOUN	NTED SA	VINGS (2F	⁻ 5+3C)				\$	5	57368.
6.		COUNTED SA < 1 PROJ					IR)=(5	/ 1F)=	4.3	8		
7.	SIM	PLE PAYBA	CK PE	RIOD (ESTIMATED)) SPB=1	F/4		2.0	4		

	*UNDECT RAMP Lighting Projects	AEP NO. 290 0379 060
EYNOLDS. SMITH AND HILLS RCHITECTS · ENGINEERS · PLANNERS INCORPORATED	DESIGNER T.TODA	DATE DATE
GP-N-2 REPLACE	INCANDESCENTS WITH CIRCLI	ne fluorescents
. 1	our a per unit basis for in	
circline fluorescent for	Atures in place of incendes	cents for
interior non-explosion	or proof applications. The	fer-unit
Calculations dre on	page 2. From the building	Jurvey data
a list of the buildings	with potential incomdescen	t lighting projects
was compiled (page	3). It is assumed for this	ECO Hast
	festures are non-explosion	
be retrofolled in the	is manher. Only areas operating 3	shifts day, 5 days luk were considered
Total fixtures =	0.1 × 1536 = 154	
Energy Sovings - 7	0:5 Rush x 0.003413 MEtu x 15.	4 = 371 MBtulyv
Energy cost savings	0.5 Rush x 0.003413 MEtu x 15. gv kush = \$21.34 x 154 furtures = yr-fixture	\$ 3286 Jur
Maxl & labor cost so	yv-fixture 5 = 3286 + 3131 = \$641	t 3131 /5V
Total cost saving	s = 3286 + 3131 = \$64	17/yr
Project cost = \$ 9.	4.47 × 15+ = +4,548	
	ost= 14,548/1.115 = \$13,0	48)
Simple payback =	\$14,548 = 2.3 yr	

REYNOLDS	. SMITH	AND	HILLS
ARCHITECTS	· ENGINEE	RS • PL	ANNERS
	INCORPORAT	ED	

RAAP	Liq	hdiva	Pro	ects
Screen	~ ((Te	c5)
DESIGNER T.	Too	9d		.=

AFP NO	290	0379	000
		OF	
DATE	*****		

DESIGNER T. Todd
CHECKER

DATE

GP-N-2 Replace interior 100-150W incandescents with 32 W screw-in
GP-N-2 Replace interior 100-150W incandiscents with 32 W screw-in fllorescent fixtures for non-explosion proof applications
A second to the land of the total of the total
- Assume original light levels should not be reduced significantly.
(32 W fluor. provides luman output between 100W and 150W incord.)
Energy Savings = (150W-37W), 2thr, 260 days = 705 kwh
Energy savings = (1510W-37W), 2thr, 260 days = 705 kwh
Energy cost savings = 705 km/ x \$0.03026 = \$21.34
Labor & mat'l cost savings = Incomb cost Flyor, cost , 6240 hr 750 hr 12,000 hr gr
750 hr 12000 hr)
= (\$2.11 metil + \$1.20.labor x 0.683) _ (\$5.55 × 14 matil + \$2.45 labor x a 483)
750 Ar 12,000 hr
= (\$2.11 met'l + \$1.20.labor × 0.683) _ (15.55×14 mat'l + \$2.45 labor × 0.683) -750 hr 12,000 hr 6240 hr = \$20.33
Total cost savings = \$21.34 + \$20.33 = \$41.67
yr gr
Math cost = \$42.90 for fixture x 1.10 inflation (1984 vendor literature)
Math cost = \$42.90 for fixture x 1.10 inflation (1984 vendor literature) + \$5.55 for lamp x 1.10 infl. = \$53.30
Labor cost = \$1.20 × 1.20 × 0.603 (cost of replacing in and, bulb + 20%)
Project lost= (1.045 x \$53.36) + (1.2 x \$0.98) x 1.661 = \$34.47
Simple payback = \$94.47 _ 2.3 yr < 10 yr. \$4467/yr

Radford Army Ammunition Plant List of Buildings with Incandescent Lighting

Bldg No	Name/Process	Location	Similar	Fixtures/Bldg.	Total Fixtures
1000 -00	Cotton Linter Warehouse	NC, A&B-Line	1	17	17
1606 -00	Open Tank Air Dry	Sol. Recovery, A-Line	10	20	200
1611 -00	Open Tank Air Dry Solvent Recovery House	Sol. Recovery, B-Line	27	12	324
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	20	60
4912 -27	SG Curing Hse Carpet Rolls	Cast Prop. (Rocket)	10	5	50
4924 -06	Machine and Saw House	Cast Prop. (Rocket)	1	6	6
7106 -04	Dry House #4 (Cure Grain)	1st R P	7	8	56
9334 -15	Blender House	4th Rolled Powder	1	4	4
TOTAL FOR	EXTERIOR FIXTURES				717
420 -02	Acid Waste Disposal (C-Line)	Waste Acid	1	8	8
	Boiling Tub House		3	50	150
2022 -00	Reater House	NC. B-Line	3	40	120
2024 -00	Poacher & Blending House	NC. B-Line	3	30	90
3513 -00	C-1 Press & Cutting House	Green, C-Line	3	50	150
4912 -40	Forced Air Dry House LG Mold Loading House	Pilot B	21	10	210
4912 -11	LG Mold Loading House	Cast Prop. (Rocket)	2	6	12
4912 -03	MK 43 Sawing and Inhibiting	Cast Prop. (Rocket)	1	4	4
4915 -00	Small Grain Mold Assembly	Cast Prop. (Rocket)	1	7	7
	Inspect/Clean NG Tanks *		1	21	21
4951 -02	TOW Launch Saw House	Pilot B	1	8	8
5 008 -01	15 Inch Press House	Pilot A	3	2	6
6304 -00	Paste Blending House	ist R P	1	20	20
7113 -00	Roll House (Rolled Powder)	1st R P (F-Line)	1 2	130	
9310 -02	Rolled Powder Building	4th Rolled Powder	2	300	600
TOTAL FOR	INTERIOR FIXTURES				1536

CONSTRUCTION COST ESTIMATE				DATE PREPARED)	SHEET	4 of 11		
ROJECT ENERGY ENGINEERING	BASIS FOR ESTIMATE								
RADFORD ARMY AMMUNITION PLANT						CODE & (No design completed)			
ARCHITECT ENGINEER	CODE C (Final deergn)								
REYNOLDS, SMITH AND HILLS A.E.P., INC.						CHECKED BY			
GP-N-2			<i>T.</i>	Tood					
Incaud. to fluor. SUMMARY	QUANT	UNIT	PER	LABOR	PER	MATERIAL	TOTAL		
	UNITS	MEAS.	UNIT	TOTAL	UNIT	TOTAL	COST		
Replace incondescent	154	fixt.	0.98	151	53.30	8208	8359		
lamps with 32W fluor.									
circline screw-ins									
	71					3/0	7/0		
Sales tax	4.5%			7.0		369	369		
FICA Insurance	20.0%	•		30		0 - 1-1	30		
Subtotal	12 2			181		8577	8758		
Overhead	15.01.						1314		
Prohit	10.0%	1					1007		
Performance Bond	1.0%						(71		
Herriles Support	6.0/2						671		
Contingency	10.0%						13047		
Construction Cost							15047		

GP-N-2 p.5 of 11

SCP ENERGY CONSERVATION PRODUCTS, 511 CANAL STREET, NYC, NY, 10013-TEL (212)-925-5991

POWER CONSUMPTION AND LUMEN CUTPUT DATA

* WA						
~ NA	mc	LINE WATTS	TOTAL LUMEN CUTPUT	LUMENS PER WATT	HOURS OF RATED LIFE	*
		VAPOR (DELUX		50	24000	*
* 10		1075	63000 23000	59 56	24000 24000	*
	00	450 290	13000	42	24000	-
	50 75	205	8500	49	24000	*
	.00	120	4500	42	24000	*
	75	93	3150	37	16000	*
	50	61	1680	31	16000	*
						*
	ETAL H		155000	102	3000	*
	00	1600 1100	155000 110000	103 100	12000	*
	00	460	34000	85	15000	*
	.00 .75	210	14000	85	7500	*
·	./ 3 	210 			/ 500 	====
******	IGH P	RESSURE SODIUM				*
1 0	000	1080	140000	130	24000	*
	00	480	50000	104	24000	<u>"</u>
	250	310	27500	89	24000	•
	L50	200	16000	80	24000	*
—	L00	135	9500		24000 24000	*
	70 50	85 7 0	5800 4000	57	24000	*
^ *	35	42	2850	67	18000	*
********FI	LIORES	esessessesses Cent				*
		40	3150	66	20000+	*
STRAIGHT	40 32	48	3150 (1830)	50	12000+	*
CIRCLINE (CIRCLINE	32) 22	<u>37</u> 25	1050	42	12000+	*
CIRCLINE	20	23	850	37	12000+	1
TWIN TUBE	13	16	900	56	10000+	+
TWIN TUBE	9	12	600	50	10000+	1
STRAIGHT	8	11	400	36	7500+	1
TWIN TUBE	7	10	400	40	10000+	,
STRAIGHT	6	9	300	33	7500+	
TWIN TUBE	5 	8 	250	31	10000+	
	INCAND	ESCENI'				1
	000	1000	23740	24	1000	1
* 7	750	750	17040	23	1000	. 1
	50 0	500	10850	22	1000	
	200	200	3710	19	750	1
	150	150	2880	19	750	
*	100 75	100 75	(1750) 1190	18 16	750 750	<u> </u>
*	/ J 252255		 	18 44 46 44 44 44 44 44 44 44 44 44 44 44	, 30 	====
*		-TODTNE				
	QUARTS					
*	500	1500	35800	24	3000	
* 1! * 10			35800 23400 10950	24 23 22	3000 2000 2600	

		T		DAILY	MAN-			BARE			TOTAL
16	6 100 Lighting	C	REW	OUTPUT	HOURS	UNIT	MAT.	LABOR	EQUIP.	TOTAL	INCL O&P
600	90 watt	1	Elec	.30	26.670	Ç	5,140	645		5,785	6,600
650	135 watt			.20	40		6,905	970		7,875	9,025
700	180 watt	1		.20	40		7,308	970		8,278	9,475
750	Quartz line, clear, 500 watt			1.10	7.270		1,872	175		2,047	2,325
760	1500 watt	- 1		.20	40		3,427	970		4,397	5,200
1800	Incandescent, interior, A21, 100 watt	1_		1.60	5		173	120		293	370
900	A21, 150 watt	I		1.60	5	1	211	120	1	331	410
2000	A23, 200 watt			1.60	5		227	120		347	430
200	PS 30, 300 watt			1.60	5		330	120	ļ	450	540
2210	PS 35, 500 watt	ı		1.60	5		576	120		696	810
2230	PS 52, 1000 watt		T	1.30	6.150		1,525	150		1,675	1,900
2240	PS 52, 1500 watt		1	1.30	6.150		2,382	150		2,532	2,850
2300	R30. 75 watt		1	1.30	6.150		375	150		525	630
2400	R40. 150 watt			1.30	6.150		408	150		558	670
2500	Exterior, PAR 38, 75 watt	$\overline{}$	\top	1.30	6.150	\vdash	566	150		716	840
	PAR 38, 150 watt	1		1.30	6.150		525	150]	675	795
2600	PAR 46, 200 wait	\neg	1	1.10	7.270		1,928	175		2,103	2,375
2800	PAR 56, 300 watt		1	1.10	7.270		2,193	175	1	2,368	2,675
3000	Guards, fluorescent lamp, 4' long		\top	1	8	+	375	195	1	570	695
3200	8' long	1	1	90	8.890		535	215	1	750	905
	RESIDENTIAL FIXTURES				0.000						1
	Fluorescent, interior, surface, circline, 32 watt & 40 watt	١,	Elec	20	.400	Ea.	48	9.70		57.70	67
0400	2' x 2', two U 40 watt	- 	1	8	1	T	66	24		90	110
0500	Shallow under cabinet, two 20 watt	1		16	500		45	12.15	l	57.15	67
0700	Wall mounted, 41, one 40 watt, with baffle		+	10	.800		41	19.40		60.40	74
0900		1	-	16	.500		36	12.15	I .	48.15	57
2000	Incandescent, exterior lantern, wall mounted, 60 watt		+-	4	2		104	49	 	153	185
2100	Post light, 150W, with 7' post		-	16	.500		16	12.15		28.15	1
2500	Lamp holder, weatherproof with 150W PAR	-	+-	12	.667		31	16.15		47.15	
2550	With reflector and guard	- 1		20	.400		78	9.70		87.70	1
2600	Interior pendent, globe with shade, 150 watt			20	.400	-	- 10	3.70		J	
0010	TRACK LIGHTING	, I.	1 Elec	6.70	1.190	Ea.	33	29	1	62	79
0080	Track, 1 circuit, 4' section		Elec	5.30	+	- CA.	48	37		85	105
0100	o section	ii l	1		1.510	1	81	44		125	155
0200	12' section		+-	4.40	1.820	1-			-	65	82
0300	3 circuits, 4' section	-		6.70	1.190	1	36	29		85	105
0400	8' section 12' section Feed kit, surface mounting	ī —		5.30	1.510	+	48	37	ļ	132	160
0500	12' section		1	4.40	1.820	1	88	44	.	24.15	
1000	Feed kit, surface mounting		-	16	.500	1	12	12.15		10.0	
1100	End cover	1		24	.333	1	1.98	li .		1	1
1200	Feed kit, stern mounting, 1 circuit		1.	16	.500	\bot	16	12.15		28.1	
1300	3 circuit	1		16	.500	1	16	12.15	1	28.1	
2000	Electrical joiner for continuous runs, 1 circuit		\perp	32	.250	\bot	6.55			12.6	
2100	3 circuit			32	.250	1	12.10	1		18.1	
2200	Fixtures, spotlight, 150 PAR			16	.500		47	12.1		59.1	_
3000	Walt washer, 250 watt tungsten halogen			16	.500		101	12.1	,	113.1	1
3100	Low voltage, 25 watt. 1 circuit	_ [16	.500		102	12.1	5	114.1	
3120	3 circuit			16	.500		109	12.15	5	121.1	5 140

200

00													
66	Lighting			DAILY	MAN- I				BARE	COSTS		TOTAL	1
9 166	6 100 Lighting	CR	EW	OUTPUT		UN	п	MAT.	LABOR	EQUIP.	TOTAL	INCL DEP	<u> </u>
	175 watt metal halide	1 E	- i	8	1	Εa	-	479	24		503	565	135
5100		١١		8		Ī		500	24		524	585	ł
5110	250 watt metal halide		\dashv	8	1	_		535	24		559	625	1
5120	150 watt high pressure sodium			8	1			556	24		580	645	
5130	250 watt high pressure sodium		\vdash	8	-	\dashv	_	525	24		549	615	1
5140	72"H 18" sq., 400 watt metal halide			8	· 1			556	24		580	645	
5150	250 watt high pressure sodium	-	\vdash		1		_	581	24		605	675	1
5160	400 watt high pressure sodium	1	'	8	' [1	'	ω.				•	1
5190	Portable rectangle, 6" high 13.5" x 20"	 	_			-	_	293	16.15		309.15	345	1
5200	175 watt metal halide	1 E	JOC	12	.667	E		314	16.15		330.15	370	1
5210	250 watt metal halide	-	-	12	.667	-			16.15		351.15	390	1
5220	150 watt high pressure sodium	1		12	.667	-		335	16.15		376.15	420	1
5230	250 watt high pressure sodium	L	\sqcup	12	.667	-		360			 	425	1
5240	8" high 18" x 24", 400 watt metal halide	1		12	.667			365	16.15		381.15	435	ı
5250	250 watt high pressure sodium	L		12	.667	_	_	376	16.15		392.15		┨
5260	400 watt high pressure sodium	1		12	.667			398	16.15		414.15	460	ı
5270	Portable square, 15" high 13.5" sq., 175 watt metal halide	L	Ш	12	.667		_	324	16.15		340.15	380	┨
5280	250 watt metal halide			12	.667			376	16.15		392.15	435	1
5290	150 watt high pressure sodium	_	Ш	12	.667			360	16.15		376.15	420	-
5300	250 watt high pressure sodium	1		12	.667			386	16.15	!	402.15	450	1
5400	Pendent 16" round/square, 175 watt metal halide			3.20	2.500		_	355	61		416	480	-
5410	250 watt metal halide			2.70	2.960			370	72		442	515	
5420	400 watt metal halide	1		2.40	3.330			398	81		479	555	4
5430	150 watt high pressure sodium	Г		3.20	2.500			398	61	ļ	459	525	ì
5440	250 watt high pressure sodium			2.70	2.960		ļ	428	72		500	575	4
5440	400 watt high pressure sodium	1		2.40	3.330		Ţ	454	81	1	535	620	
١	Too wall high process or all his	1	•	-			•				<u> </u>	1	
10000	AAADO	+											14
1 33.3	LAMP8 Fluorescent, rapid start, cool white, 2' long, 20 watt	1	Elec	1	8	i i	С	348	195	}	543	670	
0080		Ť	T	.90	8.890		Ť	198	215		413	535	7
0100	4' long, 40 watt		1	.90	8.890			442	215		657	805	
0120	3' long, 30 watt	╁		.80	10	┢	+-	874	245		1,119	1,325	7
0150	U-40 watt			.90	8.890	l		270	215		485	615	1
0170	4' long, 35 watt energy saver	╁	+	.90	8.890	1	┼	618	215		833	995	7
0200	Slimline, 4' long, 40 watt	1		.80	10	[ļ	577	245		822	990	1
0300	3' long, 75 watt	╁╴	+-	-	10	╁╴	+-	603	245	 	848	1,025	7
0350	8' long, 60 watt energy saver			.80	1	i		750	215		965	1,150	1
0400	High output, 4' long, 60 watt	+-	+-	.90	8.890	╀	+-	775	245	+	1,020	1,200	1
0500	8' long, 110 watt			.80	10	1		b .	215	Ì	1,500	1,725	
0520	Very high output, 4' long, 110 watt	╀	4-	.90	8.890	┨	+	1,285	275	+	1,560	1,825	1
0550	8' long, 215 watt	1		.70	11.430			1,285	•		2.787	3,300	1
0600	Mercury vapor, mogul base, deluxe white, 100 watt	╀	4	.30	26.670	-	+	2,142	645		2,308	2.775	1
0650	175 watt	1		.30	26.670			1,663	645	1	1	4,225	1
0700	250 watt	┸	ļ	.30	26.670	_	1	2,968	645	 	3,613		-
0800	400 watt			.30	26.670			2,340	645	1	2,985	3,525	l
0900	1000 watt		\perp	.20	40	L	\perp	5,100	970	 	6,070	7,025	-
1000	Metal halide, moguli base, 175 watt			.30	26.670	1		3,749	645	1	4,394	5,075	
1100	250 watt	L	\perp	.30	26.670	_	\perp	4,712	645		5,357	6,125	\dashv
1200	400 watt	Τ		.30	26.670	1		4,386	645	1	5,031	5,775	1
	1000 watt			.20	40	L	\perp	9. 894	970		10.864	12,300	4
1300	1000 watt, 125,000 initial lumens	Τ	T	.20	40	Γ		9,960	970		10,930	12,400	-
1320	1500 watt			.20	40			9.268	970		10.238	11,600	4
1330	Sodium high pressure, 70 watt	1	\top	.30	26.670	ol .		4,712	645		5,357	6,125	
350				.30	26.670			4,871	645		5,516	6,300	\perp
360	100 watt	+	+	.30	26.670	_	Ť	5,059	645		5,704	6,525	
1370	150 watt	1		.30	26.670			5,380	645		6,025	6,875	╛
1380	250 watt	+	+	.30	26.670	_	+	5,727	645	1	6,372	7,250	7
1400	400 watt	ł		.20	40	1		13,352	970		14,322	16,100	
1450	1000 watt		+		_	+	+	3,963	645	+	4,608	5,300	7
1500	Low pressure, 35 watt	-		.30	26.670			4,386	645		5,031	5,775	
1000 1	•			.30	26.670	3 .							

GP-N-3

ECP ENERGY CONSERVATION PRODUCTS EFFECTIVE 3/511 CANAL STREET NEW YORK, N.Y. 10013 (212)925-5991

EFFECTIVE 3/1/84

LAMP	PRICES
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	main . Wicho				
ORDERING CODE	TYPE	WATTAGE	LIST	CONT.	MIN QTY
F4T5/CW	FLUORESCENT	۱.	6.37	3.19	12
F4T5/WW	FLUORESCENT	۱.	7.17	3.59	12
F6T5/CW	FLUORESCENT	6	6.37	3.20	12
F6T5/WW	FLUORESCENT	6	8.79	4.40	12
F8T5/CW	FLUORESCENT	8	6.03	3.02	12
F8T5/WW	FLUORESCENT	8	7.15	3.58	12
FC6T9/CW	FLUORESCENT	20	10.00	5.00	12
FC6T9/WW	FLUORESCENT	20	11.35	5.68	12
FC8T9/CW	FLUORESCENT	22	10.00	5.00	12
FC8T9/WW	FLUORESCENT	22	11.35	5.68	12
FC12T9/CW	FLUORESCENT	32	11.10	5.55	12
FC12T9/WW	FLUORESCENT	32	12.50		12
FC16T9/CW	FLUORESCENT	40	13.00	6.50	12
FC16T9/WW	FLUORESCENT	40	14.75	7.38	12
PL-7	FLUORESCENT	7	13.00	6.50	10
PL-9	FLUORESCENT	9	13.00	6.50	10
PL-13	FLUORESCENT	13	14.00	7.00	10
LU-35 LU-50 LU-70 LU-100 LU-150	H.P.S. H.P.S. H.P.S. H.P.S.	35 50 70 100 150	70.00 70.00 70.00 80.00 80.00	35.00 35.00 35.00 40.00 40.00	6 6 6 6
ESX (NARROW) EAB (WIDE)	QUARTZ HALOGEN QUARTZ HALOGEN	20 20	20.00	10.00	14 14
EXT (NARROW) EXN (WIDE)	QUARTZ HALOGEN	50	21.00	10.50	14
	QUARTZ HALOGEN	50	21.00	10.50	14
EYF (NARROW) EYC (WIDE)	QUARTZ HALOGEN QUARTZ HALOGEN	75 75	22.00 22.00	11.00	<u>1</u> 4 14



with 32 watt screw-in flourescent fixture... replaces 150 watt bulb

(available in 54 watts)

Advantages

- 1. Immediate savings (no rewiring)
- 2. Long life (12,000 hrs)
- 3. Unbreakable (poly carbonate) lens
- 4. Reduced heat load (saves on refrigeration costs)
- 5. Easy cleaning
- 6. Equal illumination



Before

COMPARE COSTS*

150 watt RS/TF incandescent bulb vs. 32 watt flourescent screw-in

savings

Energy Cost

\$46.80

\$11.54 VS

nciua ng Ballasti

\$32.56

Lamp & maintenance cost

\$21.31

VS

\$ 1.82

\$19.49

By reducing the heat load caused by the incandescent bulb,

\$10.85

you can achieve additional savings on refrigeration costs i singgar on 12 hour burn i 5 d**a**vs ber iveek

Total Savings

\$62.90

DISTRIBUTED BY:



TWIST OF THE WRIST ® BRAND ENERGY SAVING LIGHTING FIXTURES

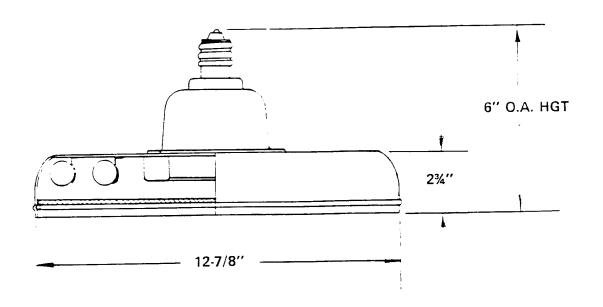
MODEL 23 32 WATT OR 54 WATT

SOCKET: Standard Medium Base HOUSING: Aluminum DIFFUSER: Clear Polycarbonate

BALLAST: Robertson R32AP-WS (32 watt)

Robertson R2232P-WS (54 watt)

MODEL =	LAMP	WATTAGE	TEMPERATURE RANGE
23-32 23-54	FC12T10 FC12T10 FC8T9	32 32 22	Down to 32°F Down to 32°F
23-32-0′ 23-54-0′	FC12T10 FC12T10	32 32	Down to 0 F Down to 0 F





GPNZ pilisfil

ECP ENERGY CONSERVATION PRODUCTS
511 CANAL STREET NEW YORK, N.Y. 10013 (212)925-5991

EFFECTIVE 3/1/84

PRICING - MODEL # 23 SCREW-IN FLUORESCENT CONVERSIONS

FIXTURE PRICES DO NOT INCLUDE LAMPS.

BALLAST

MODEL	DESCRIPTION	LIST	CONT.	MIN QTY
23 - 32 =====	32 WATT SCREW IN FLUORESCENT FIXTURE (WHITE FINISH) WITH LEXAN DIFFUSER.	85.80	42.90	3
23-54	54 WATT SCREW IN FLUORESCENT FIXTURE (WHITE FINISH) WITH LEXAN DIFFUSER. OPTIONS	99.30	49.65	3
DIFFUSER	N - WITHOUT LEXAN DIFFUSER DEDUCT	9.90	4.95	-
BALLAST	V - 277 VOLT BALLAST	12.00	6.00	
	O - ZERO DEGREE BALLAST(DOWN TO O F) 32WATT 54WATT	16.00 16.00	8.00 8.00	-

STANDARD MODEL BALLAST WILL LIGHT DOWN TO 32 F. ORDERS BELOW MINIMUM ADD 10%

PRICING - MODEL #25 RECESSED CEILING FIXTURE RETRO-FIT

FIXTURE PRICES DO NOT INCLUDE LAMP. MODEL DESCRIPTION LIST CONT. MIN QTY 25-20-DW 20 WATT RECESSED FLUORESCENT CONVERSION FIXTURE WITH SCREW IN ADAPTOR AND WHITE ACRYLIC 91.80 45.90 5 DIFFUSER (WHITE FINISH) 22 WATT - SAME AS ABOVE 25-22-DW 104.00 52.00 100 OPTIONS PQ - PARASQUARE DIFFUSER 13.40 6.70 14.90 7.45 PA - PARAHEX BODY TYPE A - ADJUSTABLE STEM CONSULT FACTORY ...

14.00 7.00

C - COLD WEATHER BALLAST